The determinants and performance impact of costing systems: A mediation perspective

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Abstract

Costing systems play an important role in organisations by estimating the relevant costs assigned to their products and/or services. Costing systems which provide accurate cost information can improve the quality of decision making and, subsequently, non-financial and financial performance. Consequently, prior research has examined the influence of contingent factors on costing systems, and the influence of costing systems on business performance. Acquiring a thorough understanding of the impact of costing systems on business performance is critical to appreciating the most relevant factors that contribute to the success or failure of a business.

Previous research on costing systems that has been underpinned by contingency theory has failed to provide a complete picture of costing systems' role due to the adoption of a selection form of fit approach. This approach only focuses on the effect of contingent factors on costing systems. It does not sufficiently address the issue of how organisational performance is affected by costing systems. In addition, little attention has been paid to activity management (AM) usage, including the extent to which activity-based costing (ABC) has been used. The term 'ABC adoption' is used to refer to whether a company decides for or against adopting ABC, and 'AM usage' relates to the way that ABC is practised. AM usage has been described as having three different levels of intensity: activity analysis (AA) usage, activity-cost analysis (ACA) usage and ABC usage. Understanding the extent to which AM is used is important in terms of identifying the factors influencing each level of AM usage. It is possible that some companies may adopt ABC on a temporary rather than a permanent basis; thus, despite not adopting ABC fully, they may be said to still consider using ABC, to some degree, in specific situations. Thus, it is possible to use ABC when it has not been adopted. In addition, some researchers have focused on the design of cost systems by measuring cost system sophistication (CSS). CSS provides a detailed measure for analysing cost systems, so that they can be located on a continuum that ranges from simple to highly sophisticated. However, previous research has been limited by inadequacies in the methods that have been used to measure CSS.

In response to the limitations of the existing literature, this research aims to employ more appropriate and comprehensive models by applying a mediation form of fit to test the influence of contingent factors on ABC adoption, AM usage and CSS, as well as to test the mediation role of non-financial performance factors between ABC adoption, AM usage and CSS, and financial performance in UK non-manufacturing companies. This study used a questionnaire with some supplementary interviews. The usable response rate is 10.95%. The results showed that competition had a direct and positive relationship with ABC usage and CSS, differentiation strategy had a direct and positive relationship with ABC adoption, and cost structure had a direct and positive relationship with ABC adoption and CSS. Service quality and cost reduction partially mediated the relationship between CSS and financial performance. In addition, cost reduction fully mediated the relationship between ABC adoption, ABC usage, and financial performance. The qualitative analysis endorses the quantitative results but also introduces contingent and performance factors that should be considered in future research.

This study contributes to the knowledge by understanding the complexity of the business environment by depicting the links and mechanisms between various contingent factors. It thereby creates a holistic model of these relationships. In addition, examining ABC adoption and AM usage independently in a single study is significant, as it serves to highlight the distinction between the concepts of adoption and usage, and to show that the way that one is influenced by the various factors may differ from the other.

Dedication

This thesis is dedicated to my parents Mohammed and Jenan; my husband Abdulaziz; and my daughter Shahad. Without them, none of my success would be possible.

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Declaration

I declare that this thesis is solely based on my own research and has not been previously submitted for a degree in this or any other university. I also declare that all information in this PhD thesis has been obtained and presented in accordance with academic rules and ethical conduct and that any thoughts from others or literal quotations are clearly marked.

Hanadi Alshamlan

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List of abbreviations

AA	Activity analysis
ABC	Activity-based costing
ABM	Activity-based management
ACA	Activity-cost analysis
AM	Activity management
AMOS	Analysis of a moment structures
AMTs	Advanced manufacturing technologies
ASV	Average shared variance
AVE	Average variance extracted
CEOs	Chief Executive Officers
CFOs	Chief Financial Officers
CR	Composite reliability
C.R.	Critical ratio
CFA	Confirmatory factor analysis
CFI	Comparative fit index
CIMA	Chartered Institute of Management Accountants
CSD	Costing system design
CSS	Cost system sophistication
DF	Degree of freedom
ERP	Enterprise resource planning
FAME	Financial Analysis Made Easy
FAO	For the attention of
GDP	Gross domestic product
GOF	Goodness-of-fit
IFI	Incremental fit index
IT	Information technology
JIT	Just-in-time
MAIs	Management accounting innovations
MASs	Management accounting systems
MCAR	Missed completely at random
MCS	Management control system
MLE	Maximum likelihood estimation

MSV	Maximum-shared variance
NNFI	Non-normed fit index
PNFI	Parsimony normed fit index
RMSEA	Root mean square errors of approximation
ROA	Return on assets
ROI	Return on investment
ROS	Returns on sales
SBUs	Strategic business units
SEM	Structural equation modelling
SIC	Standard industrial classification
SPSS	Statistical Package for the Social Sciences
SRMR	Standardise root mean residual
TCSs	Traditional costing systems
TLI	Tucker-Lewis index
UK	United Kingdom
US	United State
VCSs	Variable costing systems
Z score	Standardised score

List of conference papers and awards

Conference papers

Alshamlan, H, M., Brierley, J. A. and Hadid, W. (2019). The determinants of costing systems, and costing systems' impact on performance. Paper presented at the *British Accounting and Finance Association Annual Conference*. Birmingham, United Kingdom, 08-10 April.

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Conference awards

Received the prize of the best presentation for my PhD, *"The Inaugural Doctoral Conference,"* Sheffield University Management School (SUMS), United Kingdom, September 2017.

Received the prize of the best poster for my PhD, *"The White Rose Social Sciences Doctoral Training Partnership (WRDTP) Conference,"* the University of Leeds, United Kingdom, October 2017.

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Chapter 1: Introduction

1.1 Introduction

Since the 1980s, researchers in the area of management accounting have expressed significant interest in studying costing systems because it is one of the main parts of a general management accounting (Chenhall and Smith, 2011). The development of advanced costing systems to provide information to facilitate sound decision-making based on costs was itself prompted by various transformations in the field of business at that time, including increased automation and product life reduction (Drury, 2018; Johnson and Kaplan, 1987; Kaplan and Cooper, 1998). Companies thus began to use cost accounting systems to estimate the costs assigned to their products and services to facilitate them gaining better control of these as well as to analyse their profitability, and assign more accurate values to their inventories (Alshamlan and Zverovich, 2018).

Costing systems can be largely divided into direct costing systems and full costing systems. Direct costing systems, as the name suggests, assign only direct costs to cost objects, whether products or services, with no assignment of indirect or overhead costs.[1] Due to automation, the overhead costs increased and direct labour decreased accordingly. This is the argument in the literature due to which ignoring overhead costs or not identifying the best way to allocate them may became an issue. For example, Drury (2018) criticised direct costing systems in terms of their measurement structure and lack of assignation of overhead costs to products and services; he claimed, based on this, that their use can only be justified when the proportion of overhead costs is insignificant as compared to directly assignable costs. This is because, where this is not the case, the omission of overheads can lead to the distortion of product and service costs.

[1] The terms "indirect costs" and "overhead costs" are employed interchangeably in this thesis.

In full costing systems, direct as well as indirect costs are allocated to cost objects through activity-based costing (ABC) or a traditional cost systems (TCSs)/ an absorption costing system (Mishra and Vaysman, 2001).[2] TCSs rely on cost centres, usually focused on business departments; the overhead costs for each of these are thus accumulated and allocated proportionately to the cost objects within the relevant cost centre. The process whereby cost centre costs are assigned to cost objects makes use of volume-based cost drivers. This process is conducted primarily for the volume cost drivers, such as labour hours (Mishra and Vaysman, 2001). TCSs have, however, been criticised with regard to their allocation method of overhead costs (Cooper and Kaplan, 1988a; Johnson and Kaplan, 1987), as TCSs assign overhead costs to different production or service cost pools and use only a limited number of volume cost drivers to allocate these overhead costs to the relevant products and services (Drury, 2018).

This can be a problem because TCSs were developed prior to the significant changes in the business environment that began in the early 1980s such as increased global competition, improved manufacturing technology, decreased information costs, and deregulation, all of which have heightened the pressure on many companies to implement more advanced costing systems to provide relevant information to allow them to adapt to the business environment appropriately (Al-Omiri and Drury, 2007; Alshamlan and Zverovich, 2018; Ditkaew and Pitchayatheeranart, 2019; Drury, 2018; Guilding et al., 2005; Johnson and Kaplan, 1987; Maiga and Jacobs, 2007). TCSs may not particularly effective in these new business environments, as the information they produce is generally neither sufficiently timely nor conducive to corrective action, because the information is presented in retrospective aggregate form (Cooper and Kaplan, 1988a; Johnson and Kaplan, 1987).

[2] An absorption costing system and a traditional costing system are the same thing. Thus, ABC is not an absorption costing system. ABC and absorption/traditional costing systems are both full costing systems.

Johnson and Kaplan (1987) argued that ever-changing business environments create intense competition between companies, which will thus introduce various strategies to increase their competitiveness. One example of this is that manufacturing companies now manufacture an abundance of customised products to better align their production with consumer expectations (Kaplan, 1989). However, Hoque (2000) highlighted that this approach can lead to a significant rise in overhead costs, particularly in light of the need for greater product diversity. Accordingly, TCSs can be unable to meet the needs of current business environments, having been developed at a time when there was less competition in the market, production processes tended to be more straightforward, products were more homogeneous in nature, and greater emphasis was placed on inventory valuation, and financial reporting within accounting practices (Cooper, 1988b, 1988a, 1989b, 1989a). The main limitation of TCSs is thus their reliance on oversimplified assignment processes, which may led to distort cost information. In addition, TCSs can actively reduce the relevance of the cost information that they generate, impeding sound decision-making within a modern-day business environment. This is especially true as companies have to contend with an increasing number of varying contextual elements, such as the need for increased product diversity (Al-Omiri and Drury, 2007; Drury and Tayles, 2005; Kaplan and Cooper, 1998). This discussion also relates to non-manufacturing companies, which are the subject of the current research. “Service companies face the same changing environment that has necessitated modification in cost management practices in manufacturing companies in order for them to remain competitive” (Clarke and Mullins, 2001, p. 5).

Scholars within the management accounting field have identified the need to design cost techniques and practices that are more appropriate and applicable for current business environments. ABC was developed by Robin Cooper and Robert Kaplan during the 1980s in order to improve overhead cost allocation to cost objects. In contrast to TCSs, ABC allocates overhead costs to the various production and service cost pools based on either direct assignment or association with resource drivers, as ABC breaks down processes into activities and uses these activities to accumulate the overhead costs. Hence, ABC is reliant on volume cost drivers as well as considers non-volume cost drivers which can ensure that overhead costs are assigned more effectively to cost objects (Mishra and Vaysman, 2001). A cost pool is a location to which costs are assigned (Drury, 2018), while a cost driver is anything that influences the costs of activities, which may include the number of labour hours required or the volume produced, or various non-volume cost drivers, being "… an event associated with an activity that results in the consumption of firms' resources" (Babad and Balachandran, 1993, p. 563). ABC can supply accurate cost information at the activity level and measure the true level of resources consumed by the creation of a given product or service, thus may help to reduce cost distortions (Cagwin and Bouwman, 2002; Clarke and Mullins, 2001; Mishra and Vaysman, 2001). Contingency theory holds that there is no one best way to design management accounting and control systems, and that success depends on contingent factors (Drazin and Van de Van, 1985). Thus, TCS or ABC system can be appropriate for some companies but not for others. For example, there will be some companies that have simple costing systems may need more sophisticated costing systems to produce more accurate costs, which could improve the quality of their decision making. However, there could be other companies for whom such a costing system would not be appropriate of a simple costing system can meet their needs. More information about the contingency theory will be discussed in chapter three, section 3.2.

While this section has provided background information about costing systems, the next section (section 1.2) discusses the previous research issues inherent in examining these, with a focus on the approaches previous studies have employed to investigate costing systems and the ways in which further advances to the current body of knowledge in this area can be made. Based on this, section 1.3 presents the current research objectives and questions. Section 1.4

discusses the research design, and section 1.5 focuses on the importance of UK non-manufacturing industry in terms of the research context. Section 1.6 then discusses the potential contributions of this research while the conclusion to this chapter, along with the thesis structure, is outlined in section 1.7.

1.2 Previous research issues

As ABC systems were first introduced during the late 1980s, considerable research has now been conducted into its adoption. There are some issues related to the three streams of literature of costing methods: (1) ABC adoption, (2) activity management (AM) usage, and (3) cost system sophistication (CSS).

The issue of ABC adoption studies

Based on the reviews conducted in the past few years on management accounting research, costing systems continue to be a crucial part of research that must be further explored so that companies can devise suitable costing systems by considering how they affect the performance of these companies (Chenhall and Smith, 2011; Otley, 2016). Nevertheless, relying on the concept of ABC adoption as a means of analysing costing systems is problematic for a number of reasons. New business environments may be expected to influence the type of costing system adopted yet previous studies investigating costing systems have not provided consistent results regarding the relationship between the variables characterising the new business environment and ABC adoption (Brierley, 2011; Brown et al., 2004; Cagwin and Bouwman, 2002; Cohen et al., 2005; Elhamma and Fei, 2013; Jusoh and Miryazdi, 2015; Khalid, 2005; Malmi, 1999; Schoute, 2004). The reasons for this inconsistency may include the lack of standardised measurement of ABC adoption in the existing literature, coupled with a lack of clear definitions with regard to ABC adoption and non-ABC adoption (Al-Omiri and Drury, 2007; Askarany and Yazdifar, 2012; Brierley, 2011; Drury and Tayles, 2005).[3] This research thus attempts, as a starting point, to identify an appropriate definition of ABC adoption and non-adoption, as well as highlighting the most important factors associated with ABC adoption and the impact of ABC adoption on non-financial and financial performance.

The issue of AM usage studies

A considerable proportion of studies in the field of management accounting research have focused on ABC adoption by exploring the processes whereby companies decide whether or not to adopt ABC. This has created a dearth of research focusing specifically on AM usage,[4] which has been defined with regard to three different intensity levels (Baird, 2007; Baird et al., 2004; Gosselin, 1997): (1) activity analysis (AA) usage; (2) activity-cost analysis (ACA) usage; and (3) ABC usage. AA usage is the first level of AM usage, which refers to identifying and analysing various activities associated with providing products and services (Baird, 2007; Baird et al., 2004), while ACA usage, the second level of AM usage, identifies and calculates the costs of various activities associated with providing products and services in order to identify the factors that affect costs (Baird, 2007; Baird et al., 2004). Obviously, ABC usage is the third level and is different from its adoption. The current research, however, extends the reach of extant knowledge by testing the determinants of such usage and its influence on non-financial and financial performance.

The issue of CSS studies

Recently, it has been suggested that costing systems ought to be measured by their level of sophistication rather than in relation to ABC adoption (Abernethy et al., 2001; Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005; Schoute, 2009). CSS thus adopts a far

[3] This issue is discussed in greater detail in section 1.6.
[4] This issue is discussed in greater detail in section 1.6.

broader approach to analysing cost systems, with costing systems classified from simple costing systems to highly sophisticated ones. The sophistication level of costing systems is often defined in terms of the number and type of cost pools and second-stage cost drivers involved (Abernethy et al., 2001; Brierley, 2008b), and CSS studies used the number of cost pools, number of cost drivers, or the composite score of cost pools and cost drivers (Abernethy et al., 2001; Brierley, 2008b; Drury and Tayles, 2005; Schoute, 2009). However, CSS research has been limited by restrictions to the methods utilised for measurement: CSS research by Al-Omiri and Drury (2007), Drury and Tayles (2005), and Ismail and Mahmoud (2012) all excluded companies using variable costing systems (VCSs), thus only examining companies that incorporate overheads into their product costs, creating incomplete samples. In addition, CSS research by Al-Omiri and Drury (2007), and Drury and Tayles (2005) used composite scores to measure CSS, which cannot adequately convey the extent of complexity, nor differentiate volume from non-volume cost drivers.[5] Thus, this study utilises the concept of CSS to understand the factors influencing CSS and the influence of CSS on non-financial and financial performance.

The relationship between costing systems and performance also is one of the limitations of the previous research. Acquiring a thorough understanding of the general influences of costing systems and, more specifically, costing systems' impact on performance is critical to gaining an insight into the complete picture of costing systems. However, previous research on ABC adoption, AM usage, and CSS as underpinned by contingency theory did not provide a complete outline either of the factors influencing costing systems or of costing systems' impact on performance (Al-Omiri and Drury, 2007; Baird, 2007; Bjørnenak, 1997; Brierley, 2008b, 2011; Brown et al., 2004; Drury and Tayles, 2005; Gosselin, 1997; Krumwiede, 1998; Malmi,

[5] This issue is discussed in greater detail in section 1.6.

1999; Schoute, 2004). This is most likely due to the lack of appropriate application of this theory in relation to the forms of fit adopted (Drazin and Van de Van, 1985). The existing literature provides an incomplete picture of costing systems' role based on adopting a selection form of fit approach (Drazin and Van de Van, 1985).[6] While the selection form of fit has been pervasively adopted for management accounting research, it focuses only on the effect of contingent factors on costing systems, paying insufficient attention to the ways in which organisational performance is affected by costing systems.[7] The problem with prior selection form of fit research is not the research itself, but that the research did not go far enough to consider the impact of cost system sophistication on performance. In particular, it excludes the measurement of performance, as it assumes that all organisations are in equilibrium and that performances do not differ. However, although previous research on selection form of fit is lacking in some areas, it has built and developed a comprehensive model. Consequently, this research instead applies a mediation form of fit approach to contingency theory, which offers a more comprehensive picture of how contingent factors affect costing systems, in addition to demonstrating how costing systems affect non-financial and financial performance.

Based on these issues, the current research develops and investigates a holistic model based on the mediation form of fit approach to contingency theory. This links the contingent factors for ABC adoption, AM usage, and CSS, which, in turn, are hypothesised to influence non-financial performance and, ultimately, a business unit's financial performance. This research is focused on non-manufacturing industry in the UK, and six contingent factors are adapted from the management accounting and cost accounting literature to test for their direct relationships with ABC adoption, AM usage, and CSS. These contingent factors are competition, service diversity, differentiation strategy, cost leadership strategy, cost structure, and the size of the

[6] The selection form of fit and congruence form of fit have generally been used interchangeably in contingency management accounting research (Gerdin and Greve, 2004).
[7] This issue is discussed in greater detail in section 1.6.

business unit.[8] An examination of the indirect relationships was therefore performed to test the mediation role of cost structure between service diversity and ABC adoption, AM usage, and CSS; of service diversity between differentiation strategy and ABC adoption, AM usage, and CSS; and of cost structure between differentiation strategy and ABC adoption, AM usage, and CSS. The aim of examining the indirect relationships between contingent factors is to overcome the limitation of contingency costing literature related to the assumption that the contingent factors have an independent effect on the costing system. Thus, the current research aims to explore the potential interrelation among these contingent factors.

In addition, this study aims to contribute to the costing systems and financial performance literature by explaining the mechanism that links costing systems to financial performance through the mediation role of non-financial performance, where non-financial performance includes service quality, service cycle time, and cost reduction, which could transform the effect of costing systems on financial performance.

1.3 Research objectives and questions

As highlighted in section 1.2, the aim of the current research is to examine the influence of contingent factors on costing systems, as well as to determine their impact on financial performance by investigating the mediation role played by non-financial performance factors within medium and large UK-based non-manufacturing companies. To achieve this aim, the following two objectives have been set:

1. To examine the extent to which a set of contingent factors influence ABC adoption, AM usage, and the level of CSS; and

[8] The terms "size of the business unit", "organisational size", "company size", "size" and "firm size" are employed interchangeably in this thesis.

2. To examine the indirect influence of ABC adoption, AM usage, and CSS on financial performance through non-financial performance factors.

In order to achieve these objectives, this research addresses two key groups of research questions.

The first group aims to achieve the first research objective, and thus focuses on the influence of contingent factors on ABC adoption, AM usage, and CSS separately. The questions involved are therefore:

RQ

$\boldsymbol{RQ_{1/1}}$ What is the current extent of ABC adoption, AM usage, and CSS among medium and large UK non-manufacturing companies?

$\boldsymbol{RQ_{1/2}}$ To what extent does competition, service diversity, business strategy, cost structure, and size of the business unit influence ABC adoption, AM usage, or CSS?

$\boldsymbol{RQ_{1/3}}$ To what extent does cost structure mediate the relationship between service diversity and ABC adoption, AM usage, or CSS?

$\boldsymbol{RQ_{1/4}}$ To what extent does service diversity mediate the relationship between differentiation strategy and ABC adoption, AM usage, or CSS?

$\boldsymbol{RQ_{1/5}}$ To what extent does cost structure mediate the relationship between differentiation strategy and ABC adoption, AM usage, or CSS?

$\boldsymbol{RQ_{1/6}}$ What opinions do interviewees have about the influence of the contingent factors on ABC adoption, AM usage, and CSS?

$\boldsymbol{RQ_{1/7}}$ What are interviewees' views on any unexpected results arising from the influence of the contingent factors on ABC adoption, AM usage, and CSS?

$\boldsymbol{RQ_{1/8}}$ Do interviewees identify any other contingent factors that may influence ABC adoption, AM usage, and CSS, and what are their opinions on these if so?

The second group of questions aims to achieve the second research objective, and thus focuses on the influence of ABC adoption, AM usage and CSS on non-financial and financial performance. The questions involved are:

$RQ_{2/1}$ To what extent does ABC adoption, AM usage, and CSS influence service quality, service cycle time reduction, and cost reduction?

$RQ_{2/2}$ To what extent does service quality influence service cycle time reduction or cost reduction?

$RQ_{2/3}$ To what extent does service cycle time reduction influence cost reduction?

$RQ_{2/4}$ To what extent does service quality, service cycle time reduction, and cost reduction mediate the relationships between ABC adoption, AM usage and CSS, and financial performance?

$RQ_{2/5}$ What are the opinions of interviewees about the influence of ABC adoption, AM usage, and CSS on non-financial and financial performance?

$RQ_{2/6}$ What are interviewees' views on any unexpected results arising from the influence of ABC adoption, AM usage, and CSS on non-financial and financial performance?

$RQ_{2/7}$ Do interviewees identify any other performance factors influenced by ABC adoption, AM usage, or CSS, and what are their opinions on these if so?

1.4 Research design

In order to address these research questions, a quantitative research with some supplementary interviews was used to collect both quantitative and qualitative data. A questionnaire survey was used for the main data collection method phase, addressing nine of the research questions ($RQ_{1/1}$ - $RQ_{1/5}$, and $RQ_{2/1}$ – $RQ_{2/4}$), while, a number of supplementary interviews were used in the second phase of the data collection process to address the six qualitative questions of this study ($RQ_{1/6}$ - $RQ_{1/8}$, and $RQ_{2/5}$ – $RQ_{2/7}$).

1.5 The UK non-manufacturing environment context

The research context of this study is UK non-manufacturing companies, which was chosen for several reasons. As noted by Oke (2007), recently, the UK's non-manufacturing industry have grown compared with manufacturing industry. Furthermore, the growing competitiveness in the non-manufacturing industry has led to an increased gross domestic product (GDP) in the UK as the sector's labour market employment rate from 1948 to 2020 has grown from 46% (Jones, 2013) to 76.5% (Office for National Statistics, 2020). The increase of competition in non-manufacturing companies may led them to invest in advanced costing systems to gain various benefits, including reduced costs and improved competitive position (Clarke and Mullins, 2001). In addition, as this research aimed to test a theoretical model and hypotheses related to non-manufacturing industry, it needed to be conducted within a country with an established non-manufacturing industry, which allows reasonable access to participants working in such industries through a research questionnaire and interviews. This research was therefore conducted in the UK, which is also classified as a developed country and may be expected to have businesses that have adopted ABC and sophisticated costing systems more frequently than those on developing countries (Charaf and Bescos, 2013; Ismail and Mahmoud, 2012; Rankin, 2020). For example, in the context of a country like the UK Rankin (2020, p. 68) has argued that "country specific environmental factors, such as economic stability and education systems influence the rate of ABC adoption".

This UK-based study is therefore in line with the growing interest in conducting accounting research in developed countries, as well as offering an opportunity to improve current knowledge of non-manufacturing industry.

1.6 Research contributions

As discussed in section 1.2, considerable research has already been conducted on ABC adoption (Bjørnenak, 1997; Brierley, 2011, 2008a; Brown et al., 2004; Clarke and Mullins, 2001; Cohen et al., 2005; Innes et al., 2000; Jusoh and Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998; Rankin, 2020; Schoute, 2004; Van Nguyen and Brooks, 1997). Some researchers have focused on the design of cost systems, usually by measuring CSS (Abernethy et al., 2001; Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005; Guilding et al., 2005; Ismail and Mahmoud, 2012; Schoute, 2009), while others have focused on AM usage (Baird, 2007; Baird et al., 2004; Gosselin, 1997).

Research undertaken on all three costing system conceptualisations are the focus of this research (ABC adoption, AM usage, and CSS) and have examined a variety of different issues. The first stream of issues can be said to be focused on the direct relationship between environmental and organisational factors and costing systems (Al-Omiri and Drury, 2007; Baird, 2007; Brierley, 2011, 2008a; Brown et al., 2004; Cohen et al., 2005; Jusoh and Miryazdi, 2015; Khalid, 2005; Rankin, 2020; Schoute, 2004), while a second stream has focused on the direct relationship between these costing systems and performance (Baykasoğlu and Kaplanoğlu, 2008; Cohen et al., 2005; Vetchagool et al., 2020). A number of issues have been identified based on these studies, that suggest further studies are required to overcome the existing limitations to knowledge. The following sub-section will discuss the theoretical contributions of the current research, with later sub-sections focusing more specifically on related methodological and empirical contributions.

1.6.1 Theoretical contributions

The mediation perspective in contingency theory

In management accounting research, contingency theory is adopted frequently for addressing the different relationships between various organisational features, management accounting design, and their resulting consequences (Otley, 2016). This is based on evidence that organisational, operational, and management systems do not have identical effects in all environments and contexts (Drazin and Van de Van, 1985). Drazin and Van de Van (1985) noted that the contingency theory revolves around the main concept of 'fit', according to which a particular environment can be better suited only for certain operational systems and not others. Prior studies in management accounting research have thus relied on contingency theory to test the influence of contingent factors on costing systems (Al-Omiri and Drury, 2007; Baird, 2007; Baird et al., 2004; Brierley, 2008b, 2007; Drury and Tayles, 2005; Gosselin, 1997; Hoque, 2011; Krumwiede, 1998; Malmi, 1999; Schoute, 2009; Van Nguyen and Brooks, 1997). Most investigations into costing systems have used contingency theory specifically to address the selection form of fit, for example in ABC adoption research (Bjørnenak, 1997; Brierley, 2011; Brown et al., 2004; Jusoh and Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998; Malmi, 1999; Schoute, 2004), AM usage research (Askarany et al., 2010; Baird, 2007; Baird et al., 2004; Gosselin, 1997), and CSS research (Abernethy et al., 2001; Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005). Previous research that has been conducted on selection form of fit does not include a consideration of the impact of cost system sophistication on performance. The selection form of fit aims to ensure that the relationship between the organisational context, such as its environment, its size, and technology level, fits with the organisational structure (Gerdin and Greve, 2004). The selection form of fit provides an incomplete picture of the role of costing systems, because insufficient attention is paid to the ways in which organisational performance is affected by costing systems (Drazin and Van de Van, 1985). The selection form of fit thus cannot provide a framework to adequately present the relationship between the contingent factors of costing systems and the resulting performance. In particular, it excludes the measurement of performance, as it assumes that all organisations are in equilibrium, with no expected difference in performance (Drazin and Van de Van, 1985).

Another group of costing system studies has used contingency theory in the form of the interaction form of fit (Cagwin and Bouwman, 2002; Frey and Gordon, 1999; Maiga and Jacobs, 2003; Maiga et al., 2014). The interaction form of fit tests the effects of interactions between pairs of variables on a third variable, frequently performance (Drazin and Van de Van, 1985). This approach does not, however, test any direct relationships that may exist between contingent factors and costing systems. Furthermore, it does not clarify the mechanisms through which costing systems influence performance (Drazin and Van de Van, 1985), and it has also been criticised due to the limited number of contingent factors included in its analysis (Smith and Langfield-Smith, 2004).

Thus, the current research contributes to the literature on costing systems from a theoretical perspective by adopting the mediation form of fit based on contingency theory. Other researchers, most notably Drury and Tayles (2005) and Kaplan and Cooper (1998), have highlighted the benefits associated with mediation form of fit, which they attribute to its capacity to reflect the various relationships involved in the causal chain which influences the ways in which costing systems perform in a specific context or situation. A further advantage, as identified by Gerdin and Greve (2004), is that, in contrast to the selection form of fit, it makes provision for the inclusion of outcome variables based on realistic measures when determining the effectiveness of a costing system. Smith and Langfield-Smith (2004) recommended that the impact of multiple contingent factors on costing systems and the latter's effect on performance should be both examined simultaneously. They argue that the use of mediation form of fit in contingency theory can help to explain the commonalities between contingent factors, while allowing retention of awareness of the broader business environment within which these costing systems operate (Smith and Langfield-Smith, 2004). Thus, the current research applied the mediation form of fit in order to gain a deeper understanding and more comprehensive picture of how contingent factors affect costing systems, in addition to examining the way in which costing systems affect non-financial and financial performance.

As highlighted in section 1.2, six contingent factors were selected to examine their direct impact on ABC adoption, AM usage, and CSS. However, some ambiguity remains regarding whether any or all of these contingent factors have indirect relationships with costing systems. This ambiguity has arisen from inconsistent results from prior research with regard to these factors (Al-Omiri and Drury, 2007; Baird et al., 2004; Brierley, 2007). For example, previous studies have failed to report a consistent relationship between product diversity and costing systems,[9] because they have only tested the direct relationship between these two variables and thus fail to take into account the effect of cost structure as a mediator between product diversity and costing systems (Abernethy et al., 2001; Al-Omiri and Drury, 2007; Baird, 2007; Bjørnenak, 1997; Brown et al., 2004; Cagwin and Bouwman, 2002; Drury and Tayles, 2005; Ismail and Mahmoud, 2012; Jusoh and Miryazdi, 2015; Khalid, 2005; Malmi, 1999; Schoute, 2009; Schoute, 2011; Van Nguyen and Brooks, 1997). The current research studies costing systems in the UK non-manufacturing industry, and companies in this field typically incur higher indirect costs and fewer direct costs as compared to companies operating within the manufacturing sector (Drury, 2018); the corollary of this is that, in comparison to non-manufacturing companies, manufacturing companies tend to have lower proportions of indirect

[9] As this research targets UK non-manufacturing industry, the term “service diversity” is used instead of “product diversity” when discussing the research model and the empirical results because it is a more relevant term.

costs due to their higher material costs. Cost structure is thus likely to mediate the relationship between service diversity and costing systems where diversity in each main service leads to an increase in overheads in cost structure. To the author's knowledge, the mediation role of cost structure in the relationship between service diversity and costing systems has not been tested previously, and by examining this indirect relationship, the current study contributes to the existing theoretical knowledge of costing systems. Identifying cost structure as a mediator in the relationship between service diversity and costing systems could help to explain the inconsistent findings reported by previous researchers, as these may have relied on overly simplistic relationships when seeking to test the direct effects of product diversity on costing systems.

Previous studies have also found an inconsistent relationship between differentiation strategy and ABC adoption, as they have not taken the mediation role of service diversity into account (Elhamma and Fei, 2013; Gosselin, 1997; Jusoh and Miryazdi, 2015; Malmi, 1999; Schoute, 2004; Schoute, 2009). It seems likely, however, that a mediation relationship rather than a direct relationship exists between differentiation strategy and ABC adoption, as companies implementing a differentiation strategy provide unique services that require additional processes and operations, which will increase both the diversity of services and the number of non-manufacturing activities.

Companies using a differentiation strategy provide unique services and applying such strategies is costly due to increased overheads. Consequently, cost structure may also mediate the relationship between differentiation strategy and costing systems. To the author's knowledge, the mediation roles of service diversity and cost structure on the relationship between differentiation strategy and costing systems have also not been investigated previously and could help to explain the inconsistent results reported in previous studies.

In addition to these theoretical issues, wider concerns surrounding the application of contingency theory have emerged in previous work; most specifically, whilst most existing ABC studies have sought to identify a direct relationship between ABC adoption and non-financial and financial performance, they have failed to achieve consistent results (Hadid, 2019; Vetchagool et al., 2020). For example, while Jänkälä and Silvola (2012) found that ABC adoption has a positive relationship with financial performance in small Finnish companies, other empirical research has found no relationship between ABC adoption and financial performance (Cagwin and Bouwman, 2002; Ittner et al., 2002). This discrepancy could be explained by the relationship between costing systems and financial performance (Baykasoğlu and Kaplanoğlu, 2008; Cagwin and Bouwman, 2002; Clarke and Mullins, 2001; Cohen et al., 2005; Frey and Gordon, 1999; Ittner et al., 2002; Jänkälä and Silvola, 2012; McGowan and Klammer, 1997). Consequently, the current research should expand knowledge in this field and provide a deeper understanding of these mediations by testing the indirect effects of ABC adoption, AM usage, and CSS on financial performance while acknowledging the intervening role of non-financial performance factors, which act as mediators. Such a mediation effect could assist in explaining the reasons behind the inconsistent findings with regard to the association between costing systems and financial performance as reported in prior research.

AM usage

Scant scholarly attention has been devoted to AM usage, despite the fact that AM usage is indicative of the extent to which ABC has been used (Baird, 2007; Baird et al., 2004; Gosselin, 1997). As stated in section 1.2, AM usage has been defined in terms of three different levels of intensity. But, previous research has tended to use ABC adoption as a dependent variable without providing any explanation of the extent to which AM is used (Askarany and Yazdifar, 2012). However, understanding the extent to which AM is used is important in terms of identifying the factors influencing each level of AM usage. It is possible that some companies may adopt ABC on a temporary rather than a permanent basis; thus, despite not adopting ABC fully, they may be said to still consider using ABC, to some degree, in specific situations. Accordingly, the current study seeks to expand upon existing knowledge in this field by examining an AM usage model as well as an ABC adoption model. Examining both ABC adoption and AM usage models independently in a single study is important, as it may highlight the uniqueness of the concepts of adoption and usage and thus allow better comparisons to be drawn between the contingent factors affecting each model. It is also possible that the factors influencing one may differ from those affecting the other.

1.6.2 Methodological contributions

The measurement of ABC adoption

As highlighted in section 1.2, prior research into the relationship between contingent factors and ABC adoption has produced several contradictory results regarding the relationship between contingent factors and ABC adoption (Brierley, 2008a, 2011; Brown et al., 2004; Cagwin and Bouwman, 2002; Cohen et al., 2005; Elhamma and Fei, 2013; Jusoh and Miryazdi, 2015; Malmi, 1999; Schoute, 2004). Possible reasons for this include the fact that there is no standardised measurement for ABC adoption and non-adoption in the existing literature, which has resulted in inconsistent findings on both the relationship between contingent factors and ABC adoption and the relationship between ABC adoption and financial performance. Two more specific reasons have been put forward as to why these inconsistent findings have emerged:

The first is that some studies used a single item to measure ABC adoption and non-adoption (Kallunki and Silvola, 2008; Shields, 1995), which may not have effectively captured ABC experiences in practice at the organisational level. Studies reporting on a number of companies' experiences with ABC would help the participants to select their own experience of ABC in any comparison. Alcouffe et al. (2019) cited one such example, where companies still undergoing the ABC adoption consideration process could classify themselves definitively within the ABC adoption category, despite several of their characteristics not exactly aligning with those of businesses that have completed such adoption.

The second is that some other studies classified certain experiences of ABC under ABC adoption,[10] that should perhaps have been omitted from the analysis or classified as non-adoption, as these companies display different characteristics in terms of their experiences with ABC from those companies who currently utilise ABC (Alcouffe et al., 2019). For example, Van Nguyen and Brooks (1997) posited that companies that had adopted ABC, then subsequently abandoned it, yet continued to plan for its use in the future, were similar to standard ABC adopters. In addition, other studies included companies still at the stage of considering whether or not to adopt ABC as ABC adopters (Innes and Mitchell, 1995; Jusoh and Miryazdi, 2015; Krumwiede, 1998; Schoute, 2004; Schoute, 2011). However, companies with either of these two experiences with ABC cannot rightly be classified within the ABC adoption category, as they differ considerably from those firms currently using ABC (Alcouffe et al., 2019).

These limitations of earlier research can be surmounted by employing better measurements of ABC adoption and non-adoption, preventing widely varying experiences being integrated into a single category of non-adoption of ABC. Use of a more effective measurement of ABC adoption and non-adoption may therefore provide further insights into why previous studies have reported inconsistent results with regard to the relationship between contingent factors

[10] The range of experiences with ABC varied from currently adopting ABC to having never considered ABC adoption (Brierley, 2011). This must thus be seen to include companies that had intended to adopt ABC, those currently investigating whether to adopt ABC, those who have adopted ABC and then rejected it, and so on. Further explanation of how previous research has classified experiences of ABC is outlined in chapter 2, sub-section 2.2.1.

and ABC adoption and the relationship between ABC adoption and financial performance. The ABC adoption model employed in the current research thus has two dimensions: (1) ABC adoption by companies who currently use ABC, and (2) the non-adoption of ABC by companies as subdivided into eight distinct experiences of ABC (other than adoption).

The measurement of CSS

The current research is not concerned primarily with ABC adoption. It is also concerned with the CSS literature, which started in the 2000s with using ABC and non-ABC adopters as a crude measure of CSS, being an attempt to examine all types of cost systems on a binary scale. The research in this area has developed to look at all types of costing systems in a single way, such as by the number of cost pools and cost drivers and has not distinguished between different types of costing systems, such as ABC, TCSs, and VCSs. Calls have been made to extend research beyond characterising cost systems according to ABC adoption and non-adoption, and to characterise these instead according to a costing systems' sophistication based on the allocation of overhead costs to products or services (Abernethy et al., 2001; Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005; Schoute, 2009). CSS adopts a much broader approach for analysing costing systems, which can range from a simple costing system to a highly sophisticated system in which costings are measured based on the number of cost pools and cost drivers (Al-Omiri and Drury, 2007; Drury and Tayles, 2005; Ismail and Mahmoud, 2012).

As highlighted in section 1.2, CSS research is mainly limited by restrictions on the methods used to measure CSS. Previous research on costing systems has measured CSS in several dimensions, including the number of cost pools, the number of different types of cost drivers, and as a composite score of cost pools and cost drivers (Al-Omiri and Drury, 2007; Drury and Tayles, 2005; Ismail and Mahmoud, 2012). The first limitation arising from this is that several studies, including Al-Omiri and Drury (2007) and Drury and Tayles (2005), have focused on companies that have incorporated overheads into their product costs, while companies using VCSs have been excluded. Such samples are incomplete, based on this inclusion criterion because they do not include all possible costing systems.

The second limitation is that reliance solely on the number of cost pools as an objective measure does not necessarily capture the sophistication level of costing systems. In particular, some companies may have a large number of cost pools because they have a large number of departments, a factor unrelated to costing (Al-Omiri and Drury, 2007; Ismail and Mahmoud, 2012).

The third limitation is that reliance on the total number of different types of cost drivers as an objective measure alone is not appropriate as it fails to capture the individual effect of volume-based and non-volume-based drivers (Ismail and Mahmoud, 2012). Brierley (2007) demonstrated that "non-volume-level, and duration and intensity cost drivers would be expected to capture more appropriately the resources consumed by products and to increase product cost accuracy" (Brierley, 2007, p. 6). Thus, relying on the total effect of cost drivers reduces consideration of the individual effects of volume and non-volume cost drivers.

The fourth limitation is that previous studies have measured CSS based on composite scores of the number of cost pools and the total number of cost drivers (Al-Omiri and Drury, 2007; Drury and Tayles, 2005). The composite measurement used thus depended on the number of cost pools and cost drivers, a potentially insufficient measure given that no distinction is made between the number of volume and non-volume cost drivers. Sometimes, therefore, this represents companies using simple costing systems, while at other times, it can represent those using sophisticated costing systems.[11] This makes it impossible to determine whether a given company relies on simple costing systems or sophisticated costing systems based on a lack of distinction between volume and non-volume cost drivers.

This research seeks to overcome the limitations seen in the previous literature regarding the measurement of CSS. It also contributes to the current literature by distinguishing between different designs of costing systems by (1) including all companies (VCSs, TCSs, and ABC) and (2) developing a CSS measurement based on a single latent construct with three indicators: the number of cost pools, volume cost drivers, and non-volume cost drivers.

The measurement of contingent factors

Methodological results may be challenging, and skewed outcomes may emerge, when a single or a very small number of items are adopted to measure constructs; sadly, this has been the case for the majority of existing costing systems research. Previous research has failed to use multiple indicators to capture the domain of latent constructs more fully, especially with regard to competition (e.g. Brierley, 2011, 2007; Cagwin and Bouwman, 2002; Drury and Tayles, 2005; Jusoh and Miryazdi, 2015; Van Nguyen and Brooks, 1997), product diversity (e.g. Abernethy et al., 2001; Drury and Tayles, 2005; Jusoh and Miryazdi, 2015; Khalid, 2005; Malmi, 1999), and business strategy (e.g. Gosselin, 1997; Malmi, 1999). Such approaches have been too narrow, as they are unlikely to effectively capture the domain of the latent constructs and, accordingly, decrease the reliability of those constructs (McGowan and Klammer, 1997; Smith and Langfield-Smith, 2004). In addition, such approaches may lead to biased results and difficulties in interpreting empirical findings (Al-Omiri and Drury, 2007;

[11] For example, some companies have cost pools ranging between 31 and 50, as well as a cost driver have a composite score of 8 on a 15 point scale, while other companies with lower cost pools, ranging between 4 and 5, which have higher cost drivers (n = 5) also have a composite score of 8 (Drury and Tayles, 2005). It is possible if some of these cost drivers are non-volume then the cost system may deserve a higher score on Drury and Tayles' (2005) 15 poit scale of sophistications.

Drury and Tayles, 2005). The current study therefore employs multiple indicators using five-point Likert scale instruments to measure competition, service diversity and business strategy.

The use of structural equation modelling (SEM)

Some previous studies have used bivariate analysis methods (e.g. Bjørnenak, 1997; Malmi, 1999), while others have used multiple regression methods (Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005; Gosselin, 1997; Ismail and Mahmoud, 2012; Krumwiede, 1998). These analysis methods both treat the indicators of hypothesised latent constructs as being free from measurement errors (Hair et al., 2019; Smith and Langfield-Smith, 2004), which has led to calls for the application of a more rigorous analysis technique, SEM, to estimate correlations according to the latent constructs' indicator-related measurement errors, as well as to resolve those indicators' measurement errors (Hair et al., 2019; Otley, 2016). SEM has been rarely used in costing systems research (Vetchagool et al., 2020). Charaf and Rahmouni (2014) recommended that future research should use SEM, stating that they "also [suggested] using the structural equation method to study the connection between cultural and contextual variables and performance and importance level of management accounting's uses. The structural equation method allows the researcher to test complex hypotheses that may include direct and indirect effects, interactions, and reciprocal relationships" (Charaf and Rahmouni, 2014, p. 680). Consequently, the current study will contribute to the existing literature in the area of statistical analysis by adopting SEM as advised.

1.6.3 Empirical contribution

A focus on one sector in a research study

Several scholars have tested the impact of contingent factors on costing systems in both manufacturing and non-manufacturing industries (e.g. Al-Omiri and Drury, 2007; Askarany et al., 2010; Baird et al., 2004; Brown et al., 2004; Cagwin and Bouwman, 2002; Cohen et al., 2005; Drury and Tayles, 2005; Elhamma and Fei, 2013; Innes et al., 2000; Malmi, 1999; Rankin, 2020; Vetchagool et al., 2020), yet the findings from these studies have been inconsistent due to each of these two broad industry types offering different outputs in respect to products and services. Elhamma and Fei (2013) and Malmi (1999) thus could not identify a relationship between differentiation strategy and ABC adoption in manufacturing and non-manufacturing industries. It is possible that the testing of two distinct industry sectors (manufacturing and non-manufacturing) simultaneously may generate meaningless results simply because these industrial sectors are heterogeneous in nature (Alcouffe et al., 2019). Both manufacturing and non-manufacturing industries may use some kind of overhead allocation system to assess them to identify the overhead costs. For example, not all overhead costs in job costing in non-manufacturing industry are identifiable to individual jobs because they may relate to a number of jobs, and consequently there will be a need to use some kind of overhead allocation system to identify those costs with individual jobs. Hence, there is a need to assess the sophistication for these costing systems. The same issue arises in job costing in manufacturing industry.

As manufacturing companies have higher levels of material costs, they tend to have a lower proportion of indirect costs compared to non-manufacturing organisations (Drury, 2018). In addition, focusing on manufacturing and non-manufacturing industries within a single study could also produce inaccurate results as investigating each of these industries fully requires the formulation of bespoke questions in order to relate responses to their unique environment. Most previous research on costing systems has looked at the manufacturing industry (e.g. Bjørnenak, 1997; Brierley, 2011; Gosselin, 1997; Ismail and Mahmoud, 2012; Ittner, 1994; Krumwiede, 1998; Miryazdi and Jusoh, 2015; Schoute, 2009; Van Nguyen and Brooks, 1997), consequently, I am not aware of any research that has specifically considered non-manufacturing industry. There is thus insufficient research into both the adoption by non-manufacturing firms of costing systems and the factors which influence uptake in non-manufacturing industry. The current study is therefore likely to contribute empirically to the literature focusing on the non-manufacturing industry sector.

1.7 Conclusion and structure of the thesis

This chapter has reviewed the background to the study, presenting a general synopsis of costing systems as well as specifying the research objectives and questions and discussing the research design and relevance of the research in the context of UK non-manufacturing companies before finally discussing the research's contributions.

The rest of this thesis is structured into eight further chapters:

Chapter 2 appraises the current literature pertaining to the research questions, highlighting the limitations of existing research and indicating how the current study attempts to remedy these defects. Three types of literature were considered: (1) literature relating to the concepts of ABC adoption, AM usage, and CSS; (2) literature relating to the factors influencing ABC adoption, AM usage, and CSS; and (3) literature relating to the influence of ABC adoption, AM usage, and CSS on non-financial and financial performance.

Chapter 3 explores contingency theory as a framework for the current research model. In addition, this chapter discusses the concept of fit in relation to contingency theory. Finally, the selected theoretical framework and the process of hypotheses development are presented in this chapter.

Chapter 4 explains the different paradigms and philosophical assumptions adopted within the study, along with justifications for the choice of research paradigm. In addition, this chapter presents various methodological strategies and the rationale pertaining to the application of a quantitative design with supplementary interviews as used in the current research. The survey questionnaire is subsequently described in detail as representing the first phase of the data collection process. This is then followed by a discussion of the second, supplementary, phase of data collection, which is centred on a number of interviews. In addition, this chapter discusses the analysis of both the quantitative and qualitative data.

Chapter 5 presents the specific findings emerging from a preliminary analysis, including any inconsistent questionnaire answers, missing data analysis, outlier analysis, and normality analysis. In addition, this chapter attempts to assess and validate the measurement models for ABC adoption, AM usage, and CSS by means of confirmatory factor analysis (CFA) diagnostics measurements, including standardised factor loadings, goodness-of-fit-indices, modification indices, scale reliability, scale validity, and multicollinearity.

Expanding on the measurement and assessment of research constructs in chapter 5, the focus of chapters 6, 7, and 8 is on presenting the relevant descriptive statistics pertaining to the research variables, testing the structural models of ABC adoption, AM usage, and CSS to support or refute the hypotheses developed in chapter 3. These chapters incorporate both the results and a discussion of the quantitative and qualitative data in the context of findings from previous studies, making it possible to highlight the similarities and differences between the current research and previous work in this field, as well as to identify the implications of the current research findings.

Chapter 9 explores the principal conclusions emerging from this investigation with reference to those factors identified as shaping ABC adoption, AM usage and CSS. It also discusses the influence of ABC adoption, AM usage and CSS on both non-financial and financial performance. Finally, this chapter highlights the limitations of the current research and makes recommendations for future research in this field.

Chapter 2: Literature Review

2.1 Introduction

Costing systems' vital role in the development and success of contemporary companies has been examined by various academics and practitioners, as well as by professional accounting bodies, such as the Chartered Institute of Management Accountants (CIMA). However, these previous studies have conceptualised costing systems in a variety of ways, and questions remain around which contingent factors can influence the adoption of costing systems and what are the mechanisms through which costing systems may be associated with non-financial and financial performance. Previous studies on costing systems have also focused almost exclusively on activity-based costing (ABC), with few researchers focusing on activity management (AM) usage. Most of these ABC adoption studies have thus focused on whether companies adopt or decide not to adopt ABC, while AM usage relates to how ABC is applied in practice, which has been defined in terms of three different usage levels of intensity: activity analysis (AA), activity-cost analysis (ACA), and ABC usage. A few researchers have, however, focused on the design of cost systems by measuring cost system sophistication (CSS). CSS takes a much broader approach to analysing cost systems, allowing these to range from simple costing systems to highly sophisticated ones based on several dimensions such as number of cost pools and cost drivers.

The objective of this chapter is to discuss the literature relating to the two groups of research questions outlined in section 1.3, as well as to examine the limitations in the existing costing systems literature. The first group of research questions relates to the influence of contingent factors on ABC adoption, AM usage, and CSS, while the second group of research questions relates to the influence of ABC adoption, AM usage, and CSS on non-financial and financial performance. To address these questions, this chapter is thus divided into three main sections.

Section 2.2 defines the concept of costing systems and clarifies the differences between traditional costing systems (TCSs) and ABC. More specifically, this section discusses the conceptual and empirical literature describing ABC, AM usage, and CSS, and identifies the limitations of such literature. Section 2.3 reviews the empirical literature on contingent factors that influence costing systems, again also discussing the limitations of such literature. This section is therefore related to the first group of research questions. Section 2.4 discusses the relationship between costing systems and performance and the limitations of that literature, and is related to the second group of research questions. Finally, section 2.5 offers a conclusion and summary to the chapter.

2.2 Types of costing systems

In term of effectively overseeing and monitoring key organisational activities such as distribution and production, an adequate cost system is a crucial component of controlling (Kaplan and Cooper, 1998). Typically, a cost system offers data on supply costs, which allows business unit managers to make educated decisions to facilitate the achievement of wider organisational goals (Cooper and Kaplan, 1991b). There have been a number of cost system variants created and adopted over time as a result of internal and external organisational development and environmental change. The three current categories of costing system are direct costing, TCSs, and ABC (Drury, 2018).

Observing costs related to direct manufacturing costs relies on the assignment of such costs to products, as done within direct cost systems (Al-Omiri and Drury, 2007). However, in such cases, overhead costs, which are not directly linked with products, are not included under product costs (Drury, 2018). These are handled as period costs and charged within a specific timeframe. Direct costs include both direct material and direct labour costs.

TCSs costs do include overhead costs in addition to all of the other direct costs each product incurs (Drury and Tayles, 2005). The various overhead costs are specified under numerous service and production cost pools, with a small quantity of volume overhead allocation (volume cost drivers) used to apportion certain costs to products (Drury, 2018; Kaplan and Cooper, 1998).[12]

The data offered by TCSs may considered insufficiently timely and too imprecise to encourage corrective actions to address new business environments, thus may have a negative impact on decisions made thereafter (Kaplan, 1989). In particular, its response to the rapid and extensive developments seen in the business environment throughout the 1980s, such as globalisation, deregulation, the widespread use of advanced information technology (IT), and more modern manufacturing technologies, including just-in-time (JIT) and lean approaches appears limited (Drury, 2018).

These developments have also brought about a greater level of competition across various businesses within the market (Johnson and Kaplan, 1987), and to address this several companies have therefore attempted to implement strategies, including the production of individual products to meet customers' unique needs and expectations (Kaplan, 1989). This has led to greater use of a differentiation strategy (Hadid, 2019; Jusoh and Miryazdi, 2015; Porter, 1980; Schoute, 2004), which has increased product and service diversity, and also overhead costs (Hoque, 2011).[13] This suggests that TCSs may be not used effectively in these new circumstances, having been created at a time when competition was much lower, most overhead costs were based on labour costs and thus were also low, production processes were

[12] It is assumed by volume overhead allocation rates or volume cost drivers including labour hours, labour costs machine hours, and units produced that every service or product that is performed consumes these overhead costs (Drury, 2018).
[13] The influence of differentiation strategy on service diversity and cost structure will be discussed in chapter 3, sub-section 3.7.3.

straightforward due to the simplicity of products, and the focal point of accounting functions was inventory valuation, where financial reporting was critical (Cooper, 1988b). The simple assignment procedure of TCSs can allow cost information to be misconstrued in modern settings. The value of such cost information in terms of making decisions may be decreased in a business environment defined by product and service diversity and individualised products and services (Al-Omiri and Drury, 2007; Drury and Tayles, 2005).

Experts in the field of management accounting noted a need for the creation of more relevant cost techniques and practices in order to handle the new business environment's needs throughout the 1980s. Hence, ABC was formed according to Cooper and Kaplan's works for reducing TCSs' drawbacks. An ABC system does not allocate overhead costs to departmental cost pools and instead sets up costs based on activities through a direct assignment model or a resource driver. As noted by Kaplan and Cooper (1998), such costs in the ABC system are allocated to cost objects with volume and non-volume cost drivers. Non-volume overhead allocation rates (or non-volume cost drivers) (e.g. number of service design changes and hours devoted to service quality control) are not necessarily performed each time a unit of a service is performed (Drury, 2018). Pinpointing these activities and the relevant volume and non-volume cost drivers allows a cost hierarchy to be developed with four activity categories: unit-level activities, batch-level activities, product-sustaining activities, and facility-level activities (Cooper and Kaplan, 1991a). Unit level activities are volume driven and are conducted each time a unit of a product or service is produced; these are thus based on changes in the number of units produced and reflect factors such as direct labour and material costs. Batch-level activities require resources regardless of the volumes involved, being based on the number of batch processes regardless of the number of units in each batch and encompassing activities such as setting up machines. Actions taken to sustain products are those that assist the production of a specific category of product, such as process engineering. Finally, activities taken to sustain facilities aim at assisting a company to maintain facilities for the benefit of products, services, and customers, including plant management. While TCSs extend only to unit level activities, ABC systems allocate non-unit level activities using non-unit cost driver criteria.

ABC systems were first established in the late 1980s, with earlier research into ABC having primarily concentrated its efforts on categorising and describing the various types of cost systems related to the use, or non-use, of ABC. Specifically, the previous literature focused on three conceptualisations of costing systems: (1) ABC adoption, (2) AM usage, and (3) CSS. The next sub-sections will discuss the literature of ABC adoption, AM usage, and CSS in sub-sections 2.2.1, 2.2.2 and 2.2.3, respectively.

2.2.1 Activity-based costing (ABC) adoption

Various researchers have defined ABC adoption and non-adoption in their own ways. Appendix 1.1 shows several different definitions of ABC adoption and non-adoption across the literature on costing systems. While definitions of ABC adoption and non-adoption would ideally be homogeneous across various studies, this is not the case in management accounting research. Brierley (2011, p. 226) stated that "the problem with prior research into ABC adoption is that researchers have adopted a narrow approach to ABC adoption and non-adoption by assuming that ABC adopters and non-adopters, however defined, are each homogeneous group without testing whether this assumption is appropriate". For example, some studies classify consideration of adopting of ABC as part of ABC adoption (e.g. Bjørnenak, 1997; Van Nguyen and Brooks, 1997), while others classify such consideration under non-adoption (e.g. Brierley, 2011; Brown et al., 2004; Clarke and Mullins, 2001; Cohen et al., 2005; Innes et al., 2000; Jusoh and Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998; Schoute, 2004). Moreover, Krumwiede (1998) stated that those companies which abandoned

ABC following its adoption must be declared as having fulfilled ABC adoption because these companies had gathered information from ABC, thereby sharing certain features with other companies that had adopted ABC. In contrast, Jusoh and Miryazdi (2015) classified companies that adopted ABC and subsequently abandoned it as non-adopters.

In addition, Bjørnenak (1997) classified ABC adopters as those who had implemented ABC, who were currently implementing ABC, and who planned to implement ABC. In contrast, non-ABC adopters were those who did not want to adopt ABC and those who were undecided about ABC. Bjørnenak (1997) classified companies who planned to implement ABC in the ABC adoption category; these companies may have different characteristics than companies that currently adopt ABC. Moreover, Krumwiede (1998) defined levels of ABC adoption as (1) ABC being approved for implementation; (2) system analysis; (3) gaining acceptance; (4) implemented then abandoned; (5) used somewhat; and (6) used extensively. In contrast, non-adoption was divided into (1) not considering ABC; (2) considering ABC; and (3) considering then rejecting ABC. Krumwiede (1998) assumed those that implemented and abandoned ABC belonged under ABC adoption, yet did not test whether this assumption was appropriate. Brierley (2011) stated that "the implication of [all previous] research is that operating units which are categorised as not using ABC in a single group may not be a homogeneous group, which may affect any interpretation of the differences between operating units that have adopted (or are using) and have not adopted (or are not using) ABC" (Brierley, 2011, p. 228).

Brierley (2011) criticised such measurements of ABC adoption and non-adoption where these were implemented without testing whether such measurements were appropriate for the group under examination. Brierley (2011) thus used statistical tests to determine which measurements were more appropriate in a study investigating British manufacturing firm. The most appropriate measurement of ABC adoption was defined as organisations currently using ABC, while the most suitable measurements for non-adoption were found to be (1) organisations with operating units "not using ABC, but which have considered using it", (2) organisations with operating units "not using ABC, but which have considered using it, excluding those that intend to adopt it", and (3) organisations with operating units that have "rejected ABC and have not adopted ABC previously and which do not adopt ABC principles" (p. 245).

2.2.1.1 Limitations relate to the measurement of ABC adoption

As discussed earlier, one of the limitations of the existing literature on the concept of costing systems is the omission of standardised measurements for ABC adoption. Most studies on costing systems have focused on the adoption of ABC and those factors that influence the adoption of ABC (e.g. Bjørnenak, 1997; Brierley, 2011; Brown et al., 2004; Cagwin and Bouwman, 2002; Cohen et al., 2005; Elhamma and Fei, 2013; Jusoh and Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998; Malmi, 1999; Schoute, 2004). However, such studies have reported inconsistent results for the relationships between contingent factors and ABC adoption. The issue can be relate to the omission of standardised measurements for ABC adoption and non-adoption; each author has thus measured ABC adoption and non-adoption in different ways (e.g. Bjørnenak, 1997; Brierley, 2011; Brown et al., 2004; Cagwin and Bouwman, 2002; Cohen et al., 2005; Elhamma and Fei, 2013; Jusoh and Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998; Malmi, 1999; Schoute, 2004).[14]

To address the lack of a standard definition of ABC adoption, Brierley (2011) used a Kruskal Wallis and Mann Whitney test to identify the most relevant definitions for ABC adoption and non-adoption by comparing the applicability of ten previous definitions of ABC adoption. This tested the influence of several variables (competition, cost structure, product customisation,

[14] The inconclusive results in the ABC literature in relation to the influence of contingent factors and ABC adoption be due to both the measurement limitation of ABC adoption and modelling limitations. The modelling limitations will be discussed in sub-section 2.3.1.

and size of the business unit) on the different definitions of ABC adoption. According to Brierley (2011), the first definition referred to companies that use ABC while eight other definitions referred to the experience of ABC more generally, including simply intending to use ABC. Brierley (2011) observed that ABC adoption can be best defined as companies that have adopted ABC. The current research therefore uses appropriate measurements and a variety of items to demonstrate ABC adoption and non-adoption.[15] The current research used nine items to measure business units' experience of ABC. This measure is then collapsed into a measure of ABC adoption and non-adoption. These nine items are (1) business units which have adopted ABC, (2) business units intending to adopt ABC, (3) business units currently investigating whether to adopt ABC, (4) business units intending to investigate whether to adopt ABC in the near future, (5) business units which have adopted ABC and decided subsequently to abandon it, (6) business units which have investigated whether to adopt ABC and decided to reject it, (7) business units which have considered whether to adopt ABC but which did not investigate it fully and decided to reject it, (8) business units which had never considered whether to adopt ABC, and (9) other. This measurement of experience of ABC was adapted from Brierley (2011) and the measure of ABC adoption developed by collapsing the ABC experience measure into four methods of ABC adoption/non-adoption. The first method defines ABC adoption as including companies that adopted ABC and chose option 1, while non-ABC adoption excluded companies that chose option 8 (Brierley, 2011). The second method defines ABC adoption as including companies that adopted ABC and chose option 1, while non-ABC adoption excluded companies that chose options 2 and 8 (Brierley, 2011). The third method defines ABC adoption as including companies that adopted ABC and chose option 1, while non-ABC adoption excludes companies that chose options 5 and 8 (Brierley,

[15] The full measurement of ABC adoption used in this thesis is offered in chapter 4, sub-section 4.4.1.5.

2011). The fourth method defines as ABC adoption as including companies that adopted ABC and chose option 1, while non-ABC adoption includes all companies that have not currently adopted ABC (option 2 to option 8) (Brierley, 2011; Clarke and Mullins, 2001; Cohen et al., 2005; Elhamma and Fei, 2013; Ittner et al., 2002; Khalid, 2005).

2.2.2 Activity management (AM) usage

Gosselin (1997) and later followed by Baird (2007) and Baird et al. (2004), divided AM usage into three stages: AA, ACA, and ABC usage. Appendix 1.2 summarises these AM usage studies. AM usage relates to how ABC is practiced and may not mean that a company has adopted ABC fully (Drury, 2018). AM usage can help organisations to develop accurate cost systems that reflect the services and products provided (Gosselin, 1997). The first level of AM usage is AA usage which concentrates on identifying the activities and procedures that consume costs, such as materials and labour, to create outputs (Brimson, 1991). AA usage does not require a new overhead allocation method, however, as it does not require an analysis of costs, despite being a prerequisite for full ACA usage (Baird, 2007; Baird et al., 2004; Gosselin, 1997). The second level of AM usage is ACA usage which identifies and calculates the costs of various activities (Baird et al., 2004), and this can be completed without adopting a product costing system through assigning overhead costs on the basis of drivers (Gosselin, 1997). ACA usage is thus useful in reducing costs (Reeve, 1996) as well as adding a process explaining the structural causes of activity costs (Gosselin, 1997). The third level of AM usage is ABC usage, "ABC [usage] requires the completion of [both] AA and ACA levels, [as it] aims to identify and calculate the costs of various activities [to develop] an accurate rendering of product or service costs" (Alshamlan, 2018, p. 10).

2.2.2.1 Limitations relate to the concept of AM usage

One of the limitations seen in the literature relating to the concept of costing systems is a lack of studies utilising concepts of AM usage. ABC adoption has been investigated by several previous studies in the domain of management accounting, yet AM usage has not received the same level of attention despite being indicative of the extent to which ABC is used (Baird, 2007; Baird et al., 2004; Gosselin, 1997). AM usage has been defined in terms of three different levels of intensity, which are helpful to provide different perspectives. It is thus important to examine AM usage and ABC adoption in order to highlight the uniqueness of the concepts of usage and adoption and thus allow better comparisons to be drawn between the contingent factors affecting each model. Consequently, the current research tests ABC adoption models in combination with the AM usage model in order to examine how the influences on adoption vary with various levels of usage.

2.2.3 Cost system sophistication (CSS)

Although ABC was introduced until the late 1980, studies regarding what is referred to as CSS were not conducted until the 2000s by Abernethy et al. (2001) and Drury and Tayles (2000). Nevertheless, previous studies on ABC incorporated the term CSS overhead cost assignment with regards to the number of cost pools and drivers. Cooper (1988b), for example, introduced the concept of various factors impacting the design of cost systems, for which he used the term CSS. One of the advantage of CSS, according to Cooper (1988b), was thus that the cost of errors can be reduced where CSS is increased. Cost of errors refers to the cost of poor decision-making in terms of distorted product and services costs, which lead in turn to increased measurement costs, or costs related to costing system requirements. In another study by Cooper (1989b), CSS was also identified as being behind the reasons for the differences in ABC system design sophistication as implemented by various companies. In this study, Cooper (1989b) identified ABC's design sophistication as being based on the number of cost pools, and the number and type of cost drivers included, noting that ABC's design sophistication is positively affected by product diversity as well as the number of objectives of the costing system.

The majority of contingency studies regarding costing systems have operationalised CSS with regard to the adoption of ABC due to the fame of ABC systems (e.g. Brierley, 2011; Cagwin and Bouwman, 2002; Cohen et al., 2005; Ittner et al., 2002; Jusoh and Miryazdi, 2015; Krumwiede, 1998; Malmi, 1999; Schoute, 2004). Consequently, costing systems have been operationalised in other contingency studies, particularly those examining sophistication level, which varies from being simple to highly sophisticated according to various dimensions, especially the number of cost drivers and cost pools (Abernethy et al., 2001; Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005; Guilding et al., 2005; Ismail and Mahmoud, 2012; Schoute, 2009). Identifying various dimensions helps with classifying CSS levels, and previous studies about CSS have stated that CSS changes reflect the extent of complication of these dimensions, suggesting that the cost system is a continuum spanning from a simple to highly sophisticated systems. A cost system that does not have an overhead assignment process, such as variable and direct costing, or which has one cost driver and one cost pool, is considered to not have a very sophisticated design. The six relevant dimensions and the impact they have on CSS level are further explored below.

The first dimension is the number of cost pools, which is a crucial factor for CSS as it helps to classify a company's activities and departments. While TCSs depend on cost centres, that generally represent individual departments, ABC cost pools reflect such departments' activities and thus may refer to product, unit, batch, or facility activity. According to Brierley (2008b) and Drury and Tayles (2005), a rise in the number of responsibility cost centres, with every cost centre representing different stages of the process, can allow TCSs to demonstrate complexities in the production process. As per Drury and Tayles (2005), where there are several products and therefore a need to use various production and service processes that consume varying amounts of resources, this resource consumption variation can be assessed by using several cost pools that each represent a different process. Hence, if the number of cost pools is increased, then the sophistication level of the cost system is also enhanced (Abernethy et al., 2001; Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005).

The second dimension is the number of cost drivers, which aids the accurate measurement of the resources consumed by various cost objects (Abernethy et al., 2001; Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005; Schoute, 2009). Just as adding more cost drivers can help to identify cause-and-effect cost drivers and thus aid in assessing product or service resource consumption, accuracy can be enhanced by increasing the number of cost drivers (Al-Omiri and Drury, 2007; Drury and Tayles, 2005).

The third dimension reflects the "nature of cost pools (responsibility-based versus activity-based cost pools)" (Schoute, 2009, p. 209). Several studies have noted that activity-based cost pools can also help in increasing accuracy, as evidenced in ABC, over the use of responsibility-bases/departmental-based cost centres as applied in TCSs. As observed by Innes and Mitchell (1995), it is difficult to obtain substantial homogeneity using department-level cost pools, which has a negative impact on product cost accuracy. As compared to department-based cost pools, activity-based cost pools increase CSS by ensuring that additional cost pools are established for every activity and that more measurements concerning each additional cost pool are captured.

The fourth dimension depends on the nature of the cost drivers used (Schoute, 2009). Al-Omiri and Drury (2007) and Drury and Tayles (2005) classified cost drivers into transaction, intensity, and duration drivers. Transaction drivers depend on how many times activities are performed; however, these are regarded as the least accurate because of the assumption that every performance of an activity requires the same amount of resources. On the other hand, intensity drivers are regarded as the most accurate, as they enforce a direct charge for every time resources are used for every activity. As duration drivers depend on the time required for performing a given activity, they are considered more accurate than transaction drivers. Nevertheless, transaction drivers are often considered the least complicated as they only count how many times an activity is performed.

According to Abernethy et al. (2001), Drury and Tayles (2000), and Schoute (2009), the fifth dimension of cost drivers is the type in terms of being either volume or non-volume cost drivers. While volume cost drivers are concerned with unit-level activities, non-volume cost drivers concern batch-level and product level activities. Volume cost drivers such as labour costs and labour hours assume that overhead costs are consumed each time a service is performed, while non-volume cost drivers such as number of service design changes and hours devoted to service quality control are not necessarily performed each time a unit of a service is produced. Accuracy can be further enhanced by using both types of cost drivers, which allows the company to indicate the form of the cost of activities, including employing cause-and-effect cost drivers (Al-Omiri and Drury, 2007; Drury and Tayles, 2005). Compared to cost systems that use volume-based cost drivers, those that apply both types of cost drivers are regarded as more complicated (Schoute, 2009), due to the necessity of acquiring additional information about every type of cost driver.

The sixth dimension concerns how overhead costs are allocated to cost pools during the first stage of the two-stage overhead assignment procedure (Al-Omiri and Drury, 2007; Drury and Tayles, 2005). In this stage, arbitrary, direct, or cause-and-effect assignment using resource drivers may be used to assign overhead costs. Cause-and-effect or direct assignments tend to be more accurate than arbitrary assignment, as they help ensure that the resource costs allocated to cost pools are indicative of the resources' real consumption by the activities being performed in those cost pools (Cooper and Kaplan, 1991b). Moreover, direct or cause-and-effect assignments also help enhance CSS based on the need to find more resource drivers to accurately measure every resource's consumption by every cost pool.

Variation of these CSS dimensions have been applied in studies to develop different measures for CSS. Appendix 1.3 shows a breakdown of the different measurements of CSS in key CSS studies, but the important point is that not all the identified dimensions have been applied by previous studies on CSS due to difficulties in obtaining reliable information regarding the CSS dimensions in questionnaire studies (Al-Omiri and Drury, 2007; Drury and Tayles, 2005). The number of cost pools, as used by Abernethy et al. (2001), Al-Omiri and Drury (2007), Drury and Tayles (2005), Ismail and Mahmoud (2012), and Schoute (2009), is the dimension most widely employed, followed by the number of cost drivers, as used by Al-Omiri and Drury (2007), Drury and Tayles (2005), Ismail and Mahmoud (2012), and Schoute (2009). The type of cost drivers and the nature of cost pools are the third most widely-utilised dimensions, used by Abernethy et al. (2001) and Schoute (2009), while a composite measurement of CSS was used by Al-Omiri and Drury (2007) ad Drury and Tayles (2005).

2.2.3.1 Limitations relate to the measurement of CSS

Most prior studies have measured CSS based on the total number of cost pools, cost drivers, or the composite measurement of CSS; however, their results show inconsistencies in terms of the relationship between contingent factors such as competition, product diversity, and size of the business unit, and CSS (e.g. Al-Omiri and Drury, 2007; Ismail and Mahmoud, 2012; Schoute, 2009). The inconsistencies in the results may be due to the limitations in the measure of CSS.

"The current research [thus seeks to] improve the measurement of CSS by using not only the number of cost pools and the number of cost drivers but also the number of non-volume cost drivers as a measure of CSS" (Alshamlan, 2018, p. 11). "The [distinction] between volume and non-volume cost drivers [is based on] the fact that the former assumes that overhead costs are consumed each time a product or service is [produced/provided, which is not necessarily true]. [The] consumption of resources may thus be [more effectively] measured by batch sizes or similar markers rather than volume. Determining activity-associated expenditure, as well as precisely approximating the likely use of resources in relation to various products or services, thus [becomes] possible for firms based on calculating volume and non-volume cost drivers" (Alshamlan, 2018, pp. 11-12).

Based on the discussion above and the limitations in the existing research on CSS, there appears to be a lack of studies that use the concept of CSS effectively, with previous studies having focused on the ABC adoption and non-adoption (Al-Omiri and Drury, 2007; Askarany and Yazdifar, 2012). Studies on ABC adoption have tended to investigate the diffusion of ABC adoption in practice, the reasons for ABC adoption, and the factors that influence the adoption of ABC (Al-Omiri and Drury, 2007; Drury and Tayles, 2005); however, this approach does not capture the different levels of cost system sophistication due to overdependence on narrow definitions of CSS. The limitations of current ABC adoption research and the reasons for further CSS studies are thus discussed below.

The first reason is that the ABC adoption and non-adoption approach cannot differentiate between simple and sophisticated ABC systems. The second reason relates to the misunderstanding of ABC by accountants in some companies (Abernethy et al., 2001). According to Abernethy et al. (2001), some companies claim to have adopted ABC while actually using relatively sophisticated TCSs (many cost pools with two volume cost drivers).

These companies appear to be un aware of what an ABC system actually is. Taking these two reasons into account, the present research focuses on the process of the allocation of overhead costs in order to better reflect the level of CSS. This is adopted as the procedure of the allocation of overhead costs is the most relevant component in terms of the differentiation between costing system types (Al-Omiri and Drury, 2007; Kaplan and Cooper, 1998).

CSS studies have been largely impeded by the measurement methods that they have applied, as previously outlined in sub-section 1.6.2. Earlier work on costing systems has investigated various aspects of CSS, for example, quantifying the number of cost pools, as well as the different types of cost drivers, along with being based on the composite score of cost pools and cost drivers (Al-Omiri and Drury, 2007; Drury and Tayles, 2005; Ismail and Mahmoud, 2012). However, four key limitations have been identified on closer examination of these approaches. The first relates to the inclusion criteria used, whereby many studies, for example, by Al-Omiri and Drury (2007) and Drury and Tayles (2005), have solely selected companies incorporating overhead costs into their product costs, while excluding those that have adopted variable costing systems (VCSs). Accordingly, this is not sufficiently extensive as it fails to encompass all potential costing systems in existence. Secondly, the use of a single objective measure, namely, the number of cost pools, may not adequately reflect the complex nature of the costings systems currently in usage. Similarly, quantifying the total number of different types of costs drivers as a sole objective measure is a third limitation, as studies such as Ismail and Mahmoud (2012) do not take the individual effect of volume-based and non-volume-based drivers into consideration. Fourthly and finally, in earlier research by, for example, Al-Omiri and Drury (2007) and Drury and Tayles (2005), CSS measurement was based on the composite scores of the number of cost pools and the total number of cost drivers. Arguably, this approach is limited in that it fails to differentiate between the number of volume-based and non-volume-based cost drivers. Therefore, the current study endeavours to address the limitations associated with CSS measurement identified in earlier work. In addition, it seeks to build and expand upon the current body of literature by differentiating between the various costing design systems in existence. A methodological two-fold approach was adopted to achieve this. Firstly, all companies using VCSs, TCSs and ABC, were included in the study. Secondly, CSS was measured using a single latent construct comprising three key indicators, namely, the number of cost pools, volume costs drivers and non-volume costs drivers.

2.3 Factors influencing the adoption of costing systems

The previous section (2.2) discussed the concept of costing systems as related to three different themes found in the literature: ABC adoption, AM usage, and CSS. The aim of this section is to discuss briefly how the prior literature has investigated these themes and what factors have been tested in relation to each.[16]

2.3.1 Factors influencing ABC adoption

Previous studies that assessed ABC determined that adopting ABC is reliant on several conducive conditions (Cooper, 1988a; Cooper and Kaplan, 1991b). A study by Cooper (1988b), for example, found various contingent factors, such as product diversity, competition, and cost structure help firms to rationalise the adoption of ABC. This resulted in further academic evaluation of the adoption of ABC and the contingent factors that cause such adoption (Brierley, 2011; Brown et al., 2004; Cagwin and Bouwman, 2002; Cohen et al., 2005; Elhamma and Fei, 2013; Jusoh and Miryazdi, 2015; Khalid, 2005; Schoute, 2004). This section presents those research articles that have tested factors influencing the adoption of ABC, and the resulting discussion examines selected ABC adoption studies and their findings. The

[16] Chapter 3, section 3.7 discusses each contingent variable that influences ABC adoption, AM usage, and CSS relevant to this thesis in more detail.

studies discussed are those most relevant to the current research in relation to the factors that influence the adoption of ABC.

2.3.1.1 Bjørnenak (1997)

Bjørnenak (1997) focused on ABC diffusion in Norway, creating a theoretical framework based on the theory of general diffusion, which was modified to form a temporary model to depict the diffusion process. Bjørnenak (1997) conducted his study using a survey of 75 major manufacturing firms in Norway. The data collected showed that a majority of the organisations had adopted ABC as a philosophy; this meant they had either already put ABC into practice or intended to do so (approximately 40%). Several factors pertaining to competition, cost structure, prevailing costing system, and variety of product were analysed for their association with ABC use (both actual and planned), yet the only statistically significant result was for cost structure. Furthermore, while companies that had prior knowledge of ABC were comparatively larger than the ones that did not have such knowledge, no discrimination could be made on the basis of size amongst adopters and no-adopters who also had knowledge about ABC system.

2.3.1.2 Van Nguyen and Brooks (1997)

Van Nguyen and Brooks's (1997) paper provided experimental findings regarding the features of firms that had adopted ABC in contrast to those that had not adopted ABC. This evidence was based on replies gathered from more than 120 manufacturing firms. The features analysed were classified as factors of the business environment and firm characteristics, being production complexity, cost structure, size of the business unit, production diversity, and the level of competition. Based on the authors' analysis of the literature pertaining to issues faced by companies during adoption, five hypotheses were developed, and the study's conclusions indicated that there were major differences with regard to size of the business unit, production complexity, and level of competitive intensity between firms that had adopted ABC and those that had not.

2.3.1.3 Krumwiede (1998)

Krumwiede (1998) tested the influence of contingent factors on the adoption of ABC based on a survey of US manufacturing companies. Krumwiede (1998) defined ABC stages as (1) approved for implementation, (2) analysis, (3) getting acceptance, (4) implemented then abandoned, (5) used somewhat, and (6) used extensively. The study tested the influence of several factors on the adoption level of ABC; these were top management support, non-accounting ownership, clarification of objectives, training level, number of purposes for ABC use, cost distortion, usefulness of cost information, quality management, lean production systems, information technology quality, type of production, cost structure, and size of the business unit. The study found a significant relationship between cost structure and size of the business unit and ABC adoption.

2.3.1.4 Malmi (1999)

Malmi (1999) tested the influence of contingent factors on the adoption of ABC in a study examining Finnish manufacturing and non-manufacturing companies. Malmi (1999) defined ABC adopters as those either using ABC or activity-based management (ABM) or currently implementing ABC. The study thus tested the influence of company size, cost structure, business strategy, competition, and product/service diversity on the adoption of ABC and found a significant relationship between competition, business strategy, and size of the business unit with the adoption of ABC.

2.3.1.5 Cagwin and Bouwman (2002)

Cagwin and Bouwman (2002) investigated the impact of competition, product diversity, and organisational size on the adoption of ABC. They analysed improvements in financial performance based on the use of ABC and the circumstances under which the said improvements took place in both manufacturing and non-manufacturing companies in the US. Structure equation modelling (SEM) and confirmatory factor analysis (CFA) were employed to study the association between financial performance and ABC, and the findings suggested that a positive relationship could be observed between improvement in return on investment (ROI) and ABC application in complex and diverse firms, in areas that place a high emphasis on cost, and in places with limited numbers of intra-company dealings.

2.3.1.6 Brown et al. (2004)

Brown et al. (2004) investigated the influence of contingent factors on the adoption of ABC in Australian manufacturing and non-manufacturing companies. The research tested seven contingent factors: organisational size, use of consultants, top management support, internal support, product complexity, company product diversity, and cost structure, and found that top management support, internal support, and organisational size were all positively related to ABC adoption.

2.3.1.7 Schoute (2004)

Schoute's (2004) concerned the findings of a cross-sectional survey intended to analyse the competition, competitive strategy, product diversity, business strategy and organisational size determinants on ABC adoption, which was conducted in 225 mid-sized Dutch manufacturing companies. Schoute (2004) arrived at the conclusion that firms with larger product diversity and greater differentiation strategy were more likely to adopt ABC than firms with uniform production processes.

2.3.1.8 Cohen et al. (2005)

Cohen et al. (2005) analysed all three branches of Greek business, manufacturing, retail, and non-manufacturing, to study the extent to which the Greek companies had adopted ABC. Cohen et al. (2005) also studied the reasons underlying organisational choices to amend their cost accounting systems. In 2003, 88 major Greek companies were given a questionnaire to facilitate an experimental survey; then, depending on their displayed understanding of ABC, they were classified into four groups: ABC adopters, ABC supporters, ABC deniers, and ABC unawares. Cohen et al. (2005) noted that there was a satisfactory amount of ABC adoption in Greece, as well as noting that firms who had adopted the ABC had witnessed major benefits in terms of improvements to their management practices. However, sufficiency of resources was identified as having a direct impact on the issues faced by firms during the implementation of ABC. Those firms that incorporated ABC into their future growth (ABC supporters) were aware of both advantages and disadvantages of such adoption, and Cohen et al. (2005) mentioned that the likelihood of ABC adoption in the future depended greatly on the degree of satisfaction with a firm's prevailing cost accounting setup. Firms that had no intention of adopting ABC were reported to be happier with their cost accounting setups.

2.3.1.9 Khalid (2005)

Khalid (2005) used a questionnaire survey to collect data from 39 of the top 100 firms in Saudi Arabia. The data supports the idea that there is a positive relationship between firm size, product diversity, and ABC adoption. No evidence emerged as to how high level of overhead costs could lead to the adoption of ABC. Insofar as ABC users are concerned, certain descriptive statistics regarding the factors that helped the firms towards adopting ABC were, identified, and some issues encountered in the process of, and advantages due to, implementation were highlighted.

2.3.1.10 Brierley (2011)

Brierley (2011) examined the appropriateness of existing definitions of ABC adoption and non-adoption as applied to UK manufacturing companies. As discussed in section 2.2.1, the appropriate measurement of ABC adoption was thus defined solely as organisations currently using ABC and there were three possible definitions of non-adoption. Brierley (2011) tested the influence of competition, organisational size, cost structure, and product customisation on ABC adoption and found that firms that had adopted ABC tended to be larger than those that had not, irrespective of the definition of non-adoption.

2.3.1.11 Elhamma and Fei (2013)

Elhamma and Fei (2013) produced conclusions from experimental research undertaken on the associations between ABC, organisational performance, and business strategy (defenders and prospectors) amongst 62 Moroccan firms. Approximately 12.9% of the participating firms confirmed that they had adopted the ABC system, and though a logistic regression they showed that business strategy had no effect on the manner in which this new management accounting method was used. Furthermore, Elhamma and Fei (2013) concluded that management accounting systems (MASs) based on the ABC method yielded benefits for the firms that adopted them, thus demonstrating that it is beneficial for both defenders and prospectors to adopt ABC.

2.3.1.12 Jusoh and Miryazdi (2015)

Jusoh and Miryazdi (2015) tested the influence of contingent factors on ABC adoption: information technology, cost structure, product diversity, competition, business strategy, and organisational size. The research examined the various connections observed amongst environmental and technological factors and ABC diffusion stages using data from a questionnaire-based survey submitted to the Chief Financial Officers (CFOs) of multiple

Iranian manufacturing companies. After applying binary logistic regression models, an association between ABC diffusion change and the antecedent factors with regard to the diffusion stage emerged. Overall, the study indicated that the factors associated with one ABC diffusion stage (ABC adoption stage) might not be relevant to other ABC diffusion stages (ABC infusion stage). For example, analyser strategy and product diversity affect different ABC diffusion stages at different levels. The authors also pointed to the fact that uncertainty-industrial and uncertainty-financial factors each have an effect on two ABC diffusion stages, while uncertainty-economical, competition, and overhead factors affect only one ABC diffusion stage each.

The current research focused on the influence of five contingent factors on ABC adoption (competition, service diversity, business strategy, cost structure, and size of the business unit). The above discussion suggests that some factors influence ABC adoption and others do not seem to have any influence. In other words, the previous literature is inconsistent regarding the influence of contingent factors on ABC adoption. For example, some research found a significant and direct relationship between competition and ABC adoption (e.g. Cagwin and Bouwman, 2002; Jusoh and Miryazdi, 2015; Malmi, 1999; Van Nguyen and Brooks, 1997); however, others did not find a relationship between the two factors (e.g. Bjørnenak, 1997; Brierley, 2011; Cohen et al., 2005; Schoute, 2004). In addition, some research found a significant and direct relationship between product diversity and ABC adoption (e.g. Brown et al., 2004; Cagwin and Bouwman, 2002; Jusoh and Miryazdi, 2015; Khalid, 2005; Malmi, 1999; Schoute, 2004); however, others did not find a relationship between the two factors (e.g. Bjørnenak, 1997; Van Nguyen and Brooks, 1997). Furthermore, some research found a significant and direct relationship between business strategy and ABC adoption (e.g. Jusoh and Miryazdi, 2015; Schoute, 2004); however, others did not find a relationship between the two factors (e.g. Elhamma and Fei, 2013; Malmi, 1999). In addition, some research found a significant and direct relationship between cost structure and ABC adoption (e.g. Bjørnenak, 1997; Jusoh and Miryazdi, 2015; Khalid, 2005); however, others did not find a relationship between the two factors (e.g. Brierley, 2011; Brown et al., 2004; Cohen et al., 2005; Khalid, 2005; Malmi, 1999; Van Nguyen and Brooks, 1997). Finally, some research found a significant and direct relationship between the size of the business unit and ABC adoption (e.g. Bjørnenak, 1997; Brierley, 2011; Brown et al., 2004; Cagwin and Bouwman, 2002; Khalid, 2005; Krumwiede, 1998; Malmi, 1999; Van Nguyen and Brooks, 1997); however, others did not find a relationship between the two factors (Cohen et al., 2005; Schoute, 2004). These results vary based on the different ways in which ABC adoption is measured. More discussion about the relationship between contingent factors and ABC adoption will be presented in chapter 3, section 3.7

2.3.2 Factors influencing AM usage

Most prior studies have used the terms ABC adoption and non-ABC adoption, as discussed in section 2.3.1. However, a few studies have focused on AM usage. Gosselin (1997) was the first to investigate AM usage and to test factors that influence AM usage levels. This section presents those research articles testing the factors that influence AM usage, starting with Gosselin's (1997) original study.

2.3.2.1 Gosselin (1997)

Gosselin (1997) studied how strategic posture and organisational structure affect the adoption and implementation of conventional forms of AM usage. Theories of strategy and innovation in organisations were identified to explain the firms' choices to embrace and implement AM based on data gathered from Canadian manufacturing firms. This data was collected using a survey method via a questionnaire that included questions related to AM usage and implementation by strategic business units (SBUs) in the previous two years. The study's conclusions point to the fact that the extent of AM usage by SBUs is influenced by their strategy. As might be expected, firms displaying high levels of vertical differentiation are more positively associated with ABC usage as compared to other forms of AM (AA and ACA), while formalisation and centralisation are more closely related to organisations that implement ABC fully after adoption. Gosselin (1997) shed light on this obvious paradox by noting that, notwithstanding the conceptual benefits of ABC, very few firms make use of it fully, and a majority of the firms that do adopt it choose not to implement it to any significant degree. The use of ABC reflects a full set of decisions rather than a single choice, and managers get many chances to revise their first choice during the innovation process.

2.3.2.2 Baird et al. (2004) and Baird (2007)

Baird et al. (2004) and Baird (2007) analysed Australian private and public sector business units to study the level to which these used AA, ACA, and ABC as defined by Gosselin. Both papers also presented an analysis of the relationship between organisational variables, such as size, decision usefulness of cost information, business unit culture dimensions of innovation, outcome orientation, tight versus loose control and the level of usage. Data was gathered using a mail survey questionnaire in a random sample comprised of both manufacturing and non-manufacturing firms. The high levels of adoption rates as compared to those found in previous studies points to the fact that the AM usage remains relevant as well as to the advantages of using Gosselin's (1997) more precise levels of ABC. Every variable was confirmed to be in association with AM usage. The size of the business unit and the three dimensions of business culture for each unit were found to have a positive association with the level of usage for both ACA and AA. Cultural dimensions of outcome orientation, tight versus loose control, and decision usefulness were associated with ABC usage.

2.3.2.3 Askarany et al. (2010)

Askarany et al. (2010) tested the influence of contingent factors on AA, ACA, and ABC usage. The study was based on New Zealand manufacturing and non-manufacturing companies, and data was collected using a survey questionnaire which was completed by qualified CIMA professionals. Askarany et al. (2010) thus investigated the influence of firm size and industry type on AM usage and found no significant relationship between the business unit size and AM usage.

The above discussion suggests that there are some factors that influence AM usage and others which do not seem to have any influence. In other words, the previous literature is inconsistent regarding the influence of contingent factors on AA, ACA, and ABC usage. For example, Baird (2007) found a significant and direct relationship between product diversity and cost structure, and ACA and ABC usage. On the other hand, Baird et al. (2004) only found a significant and direct relationship between product diversity and cost structure, and ABC usage. In addition, Baird (2007) found a significant and direct relationship between the size of the business unit and ABC usage. On the other hand, Baird et al. (2004) found a significant and direct relationship between the size of the business unit and AA and ACA usage. These results vary with each level of AM usage. More discussion about the relationship between contingent factors and AM usage will be presented in chapter 3, section 3.7.

2.3.3 Factors influencing CSS

This section presents those research articles testing factors that influence CSS.

2.3.3.1 Abernethy et al. (2001)

Abernethy et al. (2001) analysed the impact of product diversity, advanced manufacturing technologies (AMTs), and cost structure on CSS using data was gathered from five Australian manufacturing sites. The study analysed the extent of CSS use depending on location on a continuum represented by the number of cost pools and the number and type of cost drivers. Of the five sites examined, three used simple TCSs with a maximum of three cost pools and one volume cost driver, having low product diversity, dedicated inflexible production equipment, and minimal overhead costs. This meant that the management teams were not keen on any changes, being happy with the cost information available to them and disinclined to adopt more sophisticated cost systems.

The fourth site showed high product diversity based on the fact that the firm produced several varieties of customised products in various shapes, sizes, and batches. The management of this site was satisfied with the cost information supplied by this cost system, an attitude ascribed to investment in compliant AMTs that (1) facilitated rapid production of customised products by allowing adjustments to be made to both products and volume and (2) decreased overhead costs incurred during batch and product-sustaining activities, including indirect labour. The researchers concluded that the accuracy of cost information is not necessarily increased by investing in a refined ABC system equipped with volume and non-volume cost drivers, especially when investment in flexible AMTs is present.

Finally, the fifth site made use of a fairly simple cost system with one volume driver and two cost pools, and high manufacturing overhead costs with regards to indirect labour costs. It also had huge product diversity without any investment in flexible AMTs to manage product and volume alterations. Hence, the batch-level and product-sustaining activities were diversified to a large extent and poor decisions, such as mispricing and weak operational control, occurred due to the misallocation of overhead costs. The study therefore proposed that a highly sophisticated costing system, an ABC system including activity cost pools and volume and non-volume cost drivers, needed to be applied to control and rectify the misallocation of overhead costs in this case.

2.3.3.2 Drury and Tayles (2005)

Drury and Tayles (2005) tested the influence of several contingent factors on CSS. The study used the composite measure to merge a number of cost pools and different varieties of second-stage cost drivers to estimate CSS to theoretically analyse its use in manufacturing and non-manufacturing firms in the UK. The study then proposed a higher probability that high levels of CSS will be used in large firms and in the service and financial sectors, due to the former having considerable resources spread across a variety of activities and the latter having high overhead costs in comparison to retail and manufacturing units. It was also reported that product customisation and diversity caused changes in the adoption of CSS. Overall, the analysis proposed that CSS adoption was not influenced by cost structure, competition, and decision-making in a significant manner.

2.3.3.3 Al-Omiri and Drury (2007)

Al-Omiri and Drury (2007) investigated factors that affect CSS levels in a study that used two dimensions of CSS, the numbers of cost pools and cost drivers. Their analysis also made use of two dichotomous factors: ABC adopter vs. non-adopter and direct vs. absorption costing systems. Approximately 1,000 non-manufacturing and manufacturing UK firms were given a survey questionnaire, and 176 viable responses received. The research concluded that the service and financial sector had positive impacts on the number of cost pools, ABC adoption and the number of cost drivers. The study also concluded that making use of new management accounting methods led to the adoption of ABC systems, though new management accounting methods did not demonstrate any relationship with other dependent variables. Additionally, the study proposed that the importance and size of cost information affected the absorption cost system more than the direct cost system and that ABC systems based on ABC adoption vs. non-adoption were more inclined to function in environments defined JIT or lean production practices. The number of cost pools and cost drivers were not, however, associated with the environment in any significant manner.

2.3.3.4 Brierley (2007)

Brierley (2007) used a survey questionnaire to test the relationships between contingent factors and CSS in UK manufacturing companies. The relevant contingent factors were competition, product customisation, cost structure, size, and the importance of cost information with regard to selling price decision. CSS was measured using two dimensions: (1) the number of cost pools, and (2) the number of cost drivers. The study found that only size and cost structure had a significant impact on CSS, and that none of the contingent factors impacted on the number of cost drivers. Consequently, Brierley (2007) re-specified the model from a direct model to a path analytic model (mediation model) to test for mediation relationships, with the number of cost pools expected to mediate the relationship between contingent factors and the number of cost drivers. He argued that an increase in the number of cost pool to control several activities within business units may lead management accountants to consider increase in the number of cost drivers to achieve greater accuracy of the assignment of overhead costs from cost pools to cost objects (products or services). Brierley (2007) did find that size and cost structure positively, though weakly, affected the number of cost drivers, with the number cost pools acting as a mediator.

2.3.3.5 Schoute (2009)

Schoute (2009) surveyed 133 medium-sized Dutch manufacturing units and collected data to analyse how link between CSS and the purpose of cost systems (product planning vs. cost management) affected and altered the efficiency of those cost systems, as gauged by intensity of use and level of satisfaction, all of which were determined using single item measures. The study also argued that the main motive behind using cost systems for the purposes of product planning was because this does not require high CSS. Similarly, in terms of cost management, it requires a high level of CSS in order to understand the causes of the costs related with different processes. Consequently, unsophisticated cost systems and effectiveness are positively related when used for product planning, yet this relationship might prove to highly negative for highly sophisticated cost systems. Highly sophisticated cost systems that are employed for cost management need to be associated with business unit effectiveness in a positive manner.

2.3.3.6 Ismail and Mahmoud (2012)

Ismail and Mahmoud (2012) analysed the degree to which the design of cost systems in Egyptian manufacturing units was affected by organisational and environmental factors. They made use of a questionnaire to study several privately held Egyptian firms from a broad range of industrial sectors. Their conclusions showed that Egyptian manufacturing firms made very little use of highly sophisticated cost systems, with both simple and sophisticate TCSs used more extensively; a minimal number of firms also worked with simple ABC systems. Furthermore, they discovered that CSS levels were positively related to the importance of cost information, yet there was no relationship with cost structure, intensity of competitive environment, or product diversity. The findings also showed that improving manufacturing performance by decreasing cycle and lead times, improving product quality, and decreasing costs were all related to proper selection of cost systems.

The above discussion shows that some factors do influence CSS while others do not. In other word, the previous literature is inconsistent regarding the influence of contingent factors on CSS. For example, some research found a significant and direct relationship between competition and CSS (e.g. Al-Omiri and Drury, 2007; Schoute, 2009); however, others did not find a relationship between the two factors (e.g. Drury and Tayles, 2005; Ismail and Mahmoud, 2012). In addition, some research found a significant and direct relationship between product diversity and CSS (e.g. Drury and Tayles, 2005; Schoute, 2009); however, others did not find a relationship between the two factors (e.g. Al-Omiri and Drury, 2007; Ismail and Mahmoud, 2012). Moreover, some research found a significant and direct relationship between the size of the business unit and CSS (e.g. Al-Omiri and Drury, 2007; Drury and Tayles, 2005; Schoute, 2009); however, others did not find a relationship between the two factors (e.g. Ismail and Mahmoud, 2012). These results vary with the methods used to measure CSS. More discussion about the relationship between contingent factors and CSS will be presented in chapter 3, section 3.7.

2.3.4 Limitations relating to factors influencing ABC adoption, AM usage and CSS

In terms of the studies discussed above, there are several limitations relating to inconsistent findings arising from the relationship between contingent factors and ABC adoption, AM usage and CSS. These limitations can be divided into five categories; (1) simplistic approaches to examining competition, business strategy, and service diversity; (2) the omission of mediation role of cost structure in the relationship between service diversity and costing systems; (3) the omission of the mediation role of service diversity in the relationship between differentiation strategy and costing systems; (4) the omission of the mediation role of cost structure in the relationship between differentiation strategy and costing systems, and (5) the use of mixed industries in singular research projects.

The first limitation relates to the simplistic approach often adopted for examining several contingent factors, such as competition, business strategy, and service diversity. This limitation can lead to inconsistent findings on the effect of these factors on the adoption of costing systems. In particular, several studies have failed to use a series of indicators to capture the domain of latent constructs, especially with regard to competition (e.g. Brierley, 2011; Cagwin and Bouwman, 2002; Drury and Tayles, 2005; Jusoh and Miryazdi, 2015; Van Nguyen and Brooks, 1997), product diversity (e.g. Abernethy et al., 2001; Drury and Tayles, 2005; Khalid, 2005; Malmi, 1999), and business strategy (e.g. Gosselin, 1997; Malmi, 1999). The current study relies on the use of multi-scale measurements to capture the multi-dimensional facets of a construct rather than proxy objective measurements or a single scale in order to improve the validity and reliability of the research constructs.

The second limitation arises because several studies on costing systems failed to report a consistent relationship between service diversity and costing systems due to the influence of two issues: (1) using different measures of costing systems,[17] and (2) not taking the level of overhead costs as a mediating factor into account (e.g. Abernethy et al., 2001; Al-Omiri and Drury, 2007; Baird, 2007; Bjørnenak, 1997; Brown et al., 2004; Cagwin and Bouwman, 2002; Drury and Tayles, 2005; Ismail and Mahmoud, 2012; Jusoh and Miryazdi, 2015; Khalid, 2005; Malmi, 1999; Schoute, 2009; Schoute, 2011; Van Nguyen and Brooks, 1997). Some studies found a positive significant relationship between product diversity and costing systems (e.g. Cagwin and Bouwman, 2002; Drury and Tayles, 2005; Jusoh and Miryazdi, 2015; Khalid, 2005; Malmi, 1999; Schoute, 2009; Schoute, 2004), while others found an insignificant relationship between product diversity and costing systems (e.g. Al-Omiri and Drury, 2007; Bjørnenak, 1997; Ismail and Mahmoud, 2012; Van Nguyen and Brooks, 1997). The reason for this disparity may be that these studies tested the direct relationship between product diversity and costing systems without examining any mediation relationships. The level of overhead costs could mediate the relationship between service diversity and costing systems as the diversity of each main service can lead to an increase in overhead costs in the non-

[17] The limitations that relate to the measurement of ABC adoption, and CSS were discussed in sub-sections 2.2.1.1 and 2.2.3.1, respectively.

manufacturing industry. According to Al-Omiri and Drury (2007) the level of overhead costs in non-manufacturing companies can be higher than direct costs; thus, overhead costs may mediate the relationship between service diversity and costing systems. The current research therefore tests the indirect relationship between service diversity and costing systems by investigating the role of overhead costs as a mediating factor.

The third limitation in this section relates to inconsistent findings regarding the direct relationship between differentiation strategy and ABC adoption, AM usage and CSS (e.g. Elhamma and Fei, 2013; Gosselin, 1997; Jusoh and Miryazdi, 2015; Malmi, 1999; Schoute, 2004; Schoute, 2009). Previous studies on costing systems have found an inconsistent relationship between differentiation strategy and the adoption of ABC due to two issues: (1) using different measures of ABC adoption,[18] and (2) not taking service diversity as a mediating factor into account (e.g. Elhamma and Fei, 2013; Gosselin, 1997; Jusoh and Miryazdi, 2015; Malmi, 1999; Schoute, 2004; Schoute, 2009). The relationship between differentiation strategy and ABC adoption might be better reflected by examining a mediation relationship rather than a direct relationship, as many companies that use a differentiation strategy provide unique services that require more processes and operations than standard ones, increasing the diversity of production and the number of non-manufacturing activities required.

The fourth limitation discussed in this section relates to inconsistent findings regarding the direct relationship between differentiation strategy and ABC adoption due to two issues: (1) using different measures of ABC adoption,[19] and (2) not considering the level of overhead costs as a mediating factor. Companies using a differentiation strategy tend to provide unique services; applying this strategy can therefore be costly and lead to increased overhead costs. Consequently, the level of overhead costs can be said to mediate the relationship between

[18] The limitation that relate to the measurement of ABC adoption was discussed in sub-sections 2.2.1.1.
[19] The limitation that relate to the measurement of ABC adoption was discussed in sub-sections 2.2.1.1.

differentiation strategy and ABC adoption This thesis thus aims to contribute to the costing systems literature by examining whether the mechanism of service diversity and cost structure can mediate the association between differentiation strategy and costing system.

The fifth limitation relates to industry type. Several researchers have tested the impact of contingent factors on costing systems in both manufacturing and non-manufacturing industries, developing inconsistent results potentially due to the fact that each industry has different outputs in terms of products or services; testing two groups of industries (manufacturing and non-manufacturing) simultaneously can thus devalue results due to heterogeneity (e.g. Al-Omiri and Drury, 2007; Askarany et al., 2010; Baird, 2007; Baird et al., 2004; Brown et al., 2004; Cagwin and Bouwman, 2002; Cohen et al., 2005; Drury and Tayles, 2005; Elhamma and Fei, 2013; Innes et al., 2000; Malmi, 1999). In particular, a focus on both manufacturing and non-manufacturing industries in a single research project can lead to inaccurate findings due to each of these industries requiring particular questions in a questionnaire to capture their environment correctly, such as the measurement of service diversity being very different from that of product diversity (Alcouffe et al., 2019). Prior research has often used the measurement of product diversity as applied to both manufacturing and non-manufacturing industries (e.g. Al-Omiri and Drury, 2007; Brown et al., 2004; Cagwin and Bouwman, 2002; Drury and Tayles, 2005; Malmi, 1999),[20] which may have led to inconsistent results in term of the relationships between product diversity and costing systems, with some of the studies finding the relationship between product diversity and ABC adoption and CSS significant and others finding it non-significant. In addition, some research found that there is no relationship between cost structure and ABC adoption and CSS in both manufacturing and non-manufacturing industries (e.g. Al-Omiri and Drury, 2007; Brown et al., 2004; Cohen et al., 2005; Drury and

[20] The differences between product diversity and service diversity are discussed in detail in chapter 3, sub-section 3.7.2.

Tayles, 2005; Malmi, 1999). This may be due to the use of both industries. Consequently, the current study focuses only on the level of service diversity and cost structure in non-manufacturing industry.

2.4 Costing systems and performance

This section discusses the issues related to the application of contingency theory in costing systems' studies. These issues relate to (1) the selection form of fit in contingency theory and the absence of mediation form of fit, and (2) the absence of an examination of the mediation role played by non-financial performance in the relationship between costing systems and financial performance. As discussed in in subsection 1.6.1, several studies on costing systems have followed the selection form of fit, as in ABC adoption, to examine the relationship between contingent factors and ABC adoption, AM usage, and CSS without testing financial performance. The problem with prior selection form of fit research is not the research itself, but that the research did not go far enough to consider the impact of cost system sophistication on performance. They assume that all organisations are in equilibrium, with no expected difference in performance. Appendix 1.4 summarises the existing research on costing systems and performance.

Costing system performance studies tend to focus on ABC adoption and they assume that when companies adopt ABC, they tend to use many cost pools and cost drivers, encouraging improvement in performance (Cagwin and Bouwman, 2002; Ittner et al., 2002). To the author's knowledge, this assumption has not been examined. The current research thus extends prior research by using the mediation form of form contingency theory.[21] More specifically, the current research tests not only the variables that influence ABC adoption, AM usage, and CSS,

[21] Further discussion of the concepts of fit under contingency theory are discussed in chapter 3, section 3.5.

but also the extent to which ABC adoption, AM usage, and CSS are associated with improvements in non-financial performance and, ultimately, financial performance. Table 2.1, 2.2 and 2.3 summarise the ABC adoption, AM usage, and CSS studies that have used different contingency theory approaches, respectively; overall, the relationship between costing systems and performance has been studied using three different approaches: (1) the direct approach, (2) the moderation approach, and (3) the mediation approach, which are discussed in more detail below.

Table 2.1: A summary of contingency theory approaches to ABC adoption studies

Research	Country	Industry	Research method	Sample size	Response rate/number	Contingent factors influencing costing systems	Contingent factors included in these papers that are included in this research	Contingency theory approach	Outcome variable/s
Jusoh and Miryazdi (2015)	Iran	Manufacturing	Questionnaire	400	75%	• Information technology • Cost structure • Product diversity • Competition • Business strategy • Organisational size	• Competition • Product diversity • Organisational size • Cost structure	Selection approach	N/A
Elhamma and Fei (2013)	Morocco	Manufacturing and non-manufacturing	Questionnaire	Not stated	62	• Business strategy	• Business strategy	Interaction approach (moderation)	• Competitiveness • Profitability • Productively
Brierley (2011)	UK	Manufacturing	Questionnaire	854	32.79%	• Competition • Organisational size • Cost structure • Product customisation	• Competition • Organisational size • Cost structure	Selection approach	N/A
Maiga and Jacobs (2008)	US	Manufacturing	Questionnaire	2,506	36%	N/A	N/A	Interaction approach (mediation)	• Quality improvement • Cost improvement • Cycle-time improvement • Profitability
Cohen et al. (2005)	Greek	Manufacturing, retail and non-manufacturing	Questionnaire	570	46.5%	• Competition • Organisational size • Cost structure	• Competition • Organisational size • Cost structure	Interaction approach (moderation)	• "Cost accounting" • "Cost management" • "Performance measurement" • "Decision making" • "General management" • "Relationships management" (p. 989)
Khalid (2005)	KSA	Listed companies	Questionnaire	100	39%	• Product diversity • Organisational • Size • Cost structure	• Product diversity • Organisational size • Cost structure	Selection approach	N/A

Table 2.1: Continued: a summary of contingency theory approaches to ABC adoption studies

Research	Country	Industry	Research method	Sample size	Response rate/number	Contingent factors influencing costing systems	Contingent factors included in these papers that are included in this research	Contingency theory approach	Outcome variables
Cagwin and Bouwman (2002)	US	Manufacturing and non-manufacturing	Questionnaire	1058	21.8%	• "Importance of costs" • "Information technology sophistication" • "Business unit's complexity" • "Level of intra-company transaction" • "Unused capacity" • "Competition" • "Size" • "Type of company" (p. 5)	• Competition • Product diversity • Organisational size	Interaction approach (moderation)	ROI
Ittner et al. (2002)	US	Manufacturing	Questionnaire	25,361	11%	N/A	N/A	Interaction approach (mediation)	• Plant performance: 1. ROA • Operational performance: 1. Quality 2. Time 3. Change in manufacturing cost
Frey and Gordon (1999)	US	Manufacturing	Questionnaire	622	19.8%	• Business strategy	• Business strategy	Interaction approach (moderation)	ROI
Malmi (1999)	Finland	Manufacturing and non-manufacturing	Questionnaire	690	41.6%	• Company Size • Cost structure • Strategy used in the company • Competition • Products /services diversity • Type of products	• Competition • Product diversity • Business Strategy • Size of operating units • Cost structure	Selection approach	N/A

Table 2.1: Continued: a summary of contingency theory approaches to ABC adoption studies

Research	Country	Industry	Research method	Sample size	Response rate/number	Contingent factors influencing costing systems	Contingent factors included in these papers that are included in this research	Contingency theory approach	Outcome variables
Schoute (2004)	Dutch	Manufacturing	Questionnaire	2,108	10.34%	• Formalisation • Centralisation • Competitive strategy • Size • Differentiation • Product diversity • Product line • Structure of production process • Competition • Perceive environment uncertainty	• Competition • Product diversity • Competitive strategy • Organisational size	Selection approach	N/A
Krumwiede (1998)	US	Manufacturing	Questionnaire	778	31%	• Top management support in the company • Non-accounting ownership in the company • Clarify of objectives • Training level • Number of purposes • Cost distortion • Usefulness of cost information • Quality management • Lean production systems • Information technology quality • Type of production	• Cost Structure • Size of operating units	Selection approach	N/A
Bjørnenak (1997)	Norway	Manufacturing	Questionnaire	132	57%	• Company cost structure • Level of competition • The company existing costing system • Company product diversity • Size of operating units	• Competition • Product diversity • Size of operating units • Cost structure	Selection approach	N/A
Van Nguyen and Brooks (1997)	Australia	Manufacturing	Questionnaire	350	34.3%	• Company cost structure • Company production complexity • Company production diversity • size • Competitive intensity	• Competition • Product diversity • Size of operating units • Cost structure	Selection approach	N/A

Table 2.2: A summary of contingency theory approaches to AM usage studies

Research	Country	Industry	Research method	Sample size	Response rate/number	Contingent factors influencing costing systems	Contingent factors included in these papers that are included in this research	Contingency theory approach	Outcome variables
Askarany et al. (2010)	New Zealand	Manufacturing and non-manufacturing	Questionnaire	366	39.5%	• Size • Industry type	• Size	Selection approach	N/A
Baird (2007)	Australia (Public companies)	Manufacturing and non-manufacturing	Questionnaire	250	48.4%	• Decision usefulness of cost information • Business unit size • Extent of information use • Company team orientation • Innovation • The attention to detail compensation • Company outcome orientation	• Organisational size	Selection approach	N/A
Baird et al. (2004)	Australia (Private companies)	Manufacturing and non-manufacturing	Questionnaire	400	61.5%	• Decision usefulness of cost information • • Business unit size • Product diversity • Cost structure • Extent of information use • Company team orientation • Innovation • The attention to detail compensation • Company outcome orientation	• Organisational size	Selection approach	N/A
Gosselin (1997)	Canada	Manufacturing	Questionnaire	415	39%	• Strategy • Organisational structure	• Competitive strategy	Selection approach	N/A

Table 2.3: A summary of contingency theory approaches to CSS studies

Research	Country	Industry	Research method	Sample size	Response rate/number	Contingent factors influencing costing systems	Contingent factors included in these papers that are included in this research	Contingency theory approach	Outcome variables
Ismail and Mahmoud (2012)	Egypt	Manufacturing	Questionnaire	96	85%	• Product diversity • Cost structure • Importance of company cost information • Competition	• Competition • Product diversity • Organisational size • Cost structure	Interaction approach (moderation)	• Quality • Time • Cost
Schoute (2009)	Dutch	Manufacturing	Questionnaire	2108	10.7%	• Formalisation • Centralisation • Competitive strategy • Size • Differentiation • Product diversity • Product line • Structure of production process • Competition • Perceive environment uncertainty	• Competition • Competitive strategy • Product diversity • Organisational size	Interaction approach (moderation)	• Cost system intensity of use • The extent of which the cost system is used to make decisions
Brierley (2007)	UK	Manufacturing and interview	Questionnaire	673	41.6%	• Cost structure • Size • Product customization • Competition • Importance of cost information in selling price decision	• Cost structure • Size • Product customization • Competition	Selection approach	N/A

Table 2.3: Continued: a summary of contingency theory approaches to CSS studies

Research	Country	Industry	Research method	Sample size	Response rate/number	Contingent factors influencing costing systems	Contingent factors included in these papers that are included in this research	Contingency theory approach	Outcome variables
Al-Omiri and Drury (2007)	UK	Manufacturing companies and non-manufacturing	Questionnaire	1000	19.6%	• "Importance of cost information" • "Product diversity" • "Cost structure" • "Intensity of the competitive "environment • "Size of the organization" • "The quality of information technology" • "Extent of the use of innovative management accounting techniques" • "Extent of use of lean production techniques (including JIT techniques) Business sector" (p. 405)	• Competition • Product diversity • Organisational size Cost structure	Selection approach	N/A
Drury and Tayles (2005)	UK	Manufacturing, retail and non-manufacturing	Questionnaire and interview	631	30.1%	• Competition • Product diversity • Organisation size • Cost structure Degree of customisation	• Competition • Product diversity • Organisation size Cost structure	Selection approach	N/A
Abernethy et al. (2001)	Australia	Manufacturing	Interview	Not stated	Not stated	• Product diversity	• Product diversity	Selection approach	N/A

The first approach is the direct approach, which only explores the direct impact of costing systems on performance without showing the mechanisms of how or under what conditions costing systems can impact a business unit's outcomes (Chenhall, 2003). For example, Cohen et al. (2005) examined the relationship between ABC adoption and non-adoption and performance outcomes in Greek companies in a study that defined performance as a benefit and categorised it using several different terms such as cost accounting, cost management, performance measurement, decision-making, general management, and relationship management. The study found that ABC implementation offered companies certain advantages not enjoyed by those companies that did not implement ABC, such as accurate cost calculation, decision-making, and performance measurement. In contrast, Gordon and Silvester (1999) used the direct approach in the context of US companies to test the influence of ABC adoption on stock market returns, yet found no significant difference in returns between companies that adopted ABC and companies that did not.

Elhamma and Fei (2013) found that the application of ABC can help companies increase their competitiveness, profitability, and general performance and that, in addition, ABC adoption has a significant positive influence on organisational performance in both prospector companies and defender companies. Baykasoğlu and Kaplanoğlu (2008) found that ABC application could help organisations improve their performance by increasing their effectiveness and efficiency, identifying value-added activities, and reducing or eliminating non-value-added activities. However, Pokorná (2016) used a survey questionnaire to identify Czech ABC-adopter and non-adopter companies and found that while 120 companies had adopted ABC, 428 had not. The study compared the financial performance of these companies over a five-year period showing that ABC-adopter companies did not outperform non-adopter companies.

The second approach is the moderation approach. Some studies on costing systems have investigated the indirect relationship between costing systems and performance, assuming that companies develop better performance where a moderator variable successfully moderates the relationship between costing systems and performance. For example, Cagwin and Bouwman (2002) tested the relationship between ABC implementation and financial performance, when performance was measured by statements on a five-point Likert scale regarding their return on investment (ROI) for the previous three to five years. The study found a non-significant relationship between ABC implementation and financial performance. In contrast, Cagwin and Bouwman (2002) found a positive and significant relationship between improved ROI and the interaction of ABC with production complexity, JIT, computer integrated manufacturing, value chain analysis, and the importance of cost information.

Frey and Gordon (1999) tested the direct influence of ABC adoption on financial performance, as well as examining the moderation role of business strategies (differentiation and cost leadership strategies) in the relationship between ABC and financial performance. The study found that ABC adopters outperformed the non-adopters as well as that the association between ABC adoption and financial performance was more positive and significant among those using a differentiation strategy than those using a cost leadership strategy. As with Frey and Gordon (1999), Maiga and Jacobs (2003) tested the direct effect of ABC adoption on performance as well as examining the moderation role of the balanced scorecard on the relationship between ABC adoption and performance (customer satisfaction, margin on sales, and product quality).[22] The study found that greater performance, specifically with regard to customer satisfaction and product quality, was recognised as playing a moderation role among all dimensions of the balanced scorecard with respect to ABC adoption and the two dimensions of performance. In

[22] Maiga and Jacobs (2003) did not mention what sort of margin they use.

addition, the study found that greater performance in terms of margin on sales was realised due to the moderation role of all aspects of the balanced scorecard except for internal process on the relationship between ABC adoption and the two dimensions of performance.

The third approach is the mediation approach. "Most previous ABC studies have sought to determine a direct relationship between ABC adoption and non-financial or financial performance" (Alshamlan, 2018, p. 6), failing to achieve consistent results. The reason for this may be a lack of application of the mediation approach in research investigating how costing systems can influence financial performance (e.g. Baykasoğlu and Kaplanoğlu, 2008; Cagwin and Bouwman, 2002; Clarke and Mullins, 2001; Cohen et al., 2005; Frey and Gordon, 1999; Ittner et al., 2002; Jänkälä and Silvola, 2012; McGowan and Klammer, 1997). Nevertheless, a few studies on costing systems have adopted the mediation form of fit (e.g. Ittner et al., 2002; Maiga and Jacobs, 2008).

Ittner et al. (2002) examined the relationship between extensive ABC use and plant performance and operational performance in the US. The authors classified operational performance using level of quality, cost reduction, shorter cycle times and plant performance as the return on assets (ROA), and they correctly predicted that there would be a significant relationship between ABC adoption and the level of quality and shorter cycle times; however, there was no such relationship between ABC and changes in manufacturing costs and ROA. In addition, Maiga and Jacobs (2008) tested the relationship between the extended use ABC and plant profitability as mediated by non-financial performance (product quality, cost reduction, and cycle time), finding that the extended use ABC did not have any direct influence on plant profitability relative to the relationship achieved through non-financial performance dimensions (product quality, cost reduction, and cycle time) that act as intervening factors between the extent of use ABC and plant profitability.

Based on this investigation, most prior research on costing systems appears to have applied the direct approach to testing the relationships between costing systems such as ABC and performance, or to have taken the moderation approach to test the interaction influence of ABC systems and other moderating factors on performance. However, many such studies have found no direct relationship between ABC systems and performance (e.g. Cagwin and Bouwman, 2002; Ittner et al., 2002; Maiga and Jacobs, 2003). Despite the knowledge that is likely to be uncovered by testing both the direct and moderating effects of costing systems on performance, some researchers have suggested the use of an approach that explores only the direct impact of costing systems on performance whilst also showing the mechanisms of how, or under what conditions, costing systems can impact on a business unit's outcome (Maiga and Jacobs, 2008). Consequently, the current study expands existing knowledge and provides a deeper understanding of the research area by testing the indirect effects of ABC adoption, AM usage, and CSS on financial performance as assessed in terms of the intervening role of non-financial performance factors (service quality, service cycle time reduction, and cost reduction) as mediators. Finding an important mediation effect may assist in explaining the reasons behind the inconsistent findings reported in previous research.

2.5 Conclusion

This chapter was divided into three main sections. The first section defined the concept of costing systems and clarified the differences between TCSs and ABC systems. In addition, this section discussed the conceptual literature on costing systems from three perspectives: the ABC adoption and non-adoption approach, AM usage, and CSS. The second section then reviewed the empirical literature on contingent factors that influence ABC adoption, AM usage, and CSS, while the third section discussed the relationship between costing systems and performance.

There are some limitations highlighted in these three sections that relate to prior research. The first limitation relates to the concept of costing systems, particularly (a) the omission of standardised measurements for ABC adoption, (b) the absence of studies in AM, and (c) variations in the measurement of CSS. The second limitation relates to those factors that influence the adoption of costing systems, particularly (a) simplistic approaches to examining competition, business strategy, and service diversity (b) the omission of the mediation role of cost structure in the relationship between service diversity and costing systems, (c) the omission of the mediation role of service diversity in the relationship between differentiation strategy and costing systems, and (d) the omission of the mediation role of cost structure in the relationship between differentiation strategy and costing systems. The third limitation relates to contingency theory, in particular (a) the absence of studies using a mediation form of fit, and (b) the absence of an examination of the mediation role of non-financial performance on the relationship between costing systems and financial performance. The fourth and final limitation relates to focusing on both industries (manufacturing and non-manufacturing). These limitations were discussed in the relevant sub-sections. The limitations of previous studies were highlighted to reflect the need for further research to examine the influence of contingent factors on ABC adoption, AM usage, and CSS, and to investigate the extent to which non-financial performance mediates associations between ABC adoption, AM usage, and CSS-with financial performance. As part of addressing these limitations, the next chapter discusses the application of contingency theory, the theoretical research model adopted, and the research hypotheses developed.

Chapter 3: Theoretical Framework and Hypothesis Development

3.1 Introduction

In the literature review chapter, three main streams of literature were discussed: costing systems (activity-based costing [ABC] adoption, activity management [AM] usage, and cost system sophistication [CSS]), contingent factor-costing systems associations, and costing systems-non-financial performance and financial performance associations. The aim of this chapter is to review the literature more specifically concerned with contingency theory and to develop the necessary theoretical research models and research hypotheses for this study. This chapter is organised as follows: section 3.2 explores the concepts underlying contingency theory, while section 3.3 focuses on the contingency theory model. Contingent factor categories related to contingency theory are then explored in section 3.4, while section 3.5 looks at the concept of fit under contingency theory, identifying the selection form of fit (sub-section 3.5.1), interaction form of fit (sub-section 3.5.2), system form of fit (sub-section 3.5.3), moderation form of fit (subsection 3.5.4), and mediation form of fit (sub-section 3.5.5). Section 3.6 presents the developed theoretical research model, while section 3.7 addresses and develops research hypotheses based on the literature review in chapter 2. Finally, a conclusion and summary of this chapter are outlined in section 3.8.

3.2 Contingency theory

Contingency theory is a theoretical framework used broadly in research. In particular, this theory has become a dominant paradigm for research on management control system (MCS) design (Dent, 1990) and it is also the main theory used in modern management accounting research (Fisher, 1995; Hall, 2016; Otley, 2016). This theory has, however, been applied in other fields of research such as human resource management (Flynn et al., 2010), and operations management (Sousa and Voss, 2008). Contingency theory holds that there is no one best way to design management accounting and control systems, and that success depends on contingent factors.

According to contingency theory, the impacts of organisational, management, and operational systems differ in different contexts and environments (Drazin and Van de Van, 1985). Consequently, contingency theory pivots on the key concept of "fit", which means that a specific environment might be more appropriate for some operational systems than others (Drazin and Van de Van, 1985). The definition of fit used in research in this field may have a significant influence on the data collection, types of theory developed and the statistical analysis required to test those theories (Drazin and Van de Van, 1985). Tosi and Slocum (1984) therefore argued that most problems in contingency theory research involve misunderstandings about the main concepts of the theory, which are "organisational performance" and "fit".

Contingency theory has become one of the main approaches to control system design as researchers seek to determine and explain the different relationships between organisational, environmental, and contingent factors (Dent, 1990). In addition, this theory has been used to test the relationships between contingent factors and ABC adoption (e.g. Aljabr, 2020; Bjørnenak, 1997; Brierley, 2011; Brown et al., 2004; Jusoh and Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998; Malmi, 1999; Schoute, 2004; Van Nguyen and Brooks, 1997), while others have examined it in the context of AM usage (e.g. Baird, 2007; Baird et al., 2004; Gosselin, 1997), and yet others have applied it in costing system design (CSD) to test the relationships between contingent factors and CSS (e.g. Abernethy et al., 2001; Al-Omiri and Drury, 2007; Drury and Tayles, 2005; Schoute, 2009). This thesis aims to test the fit between contingent factors across costing systems (ABC adoption, AM usage, and CSS) and to determine their influence on non-financial and financial performance. The next section begins by discussing the main model of contingency theory.

3.3 The model of contingency theory

Otley (1980) provided a model in four stages that shows how contingency theory may be applied. Figure 3.1 shows the influence of contingent factors on organisational design and structure, which, in turn, affect the design of accounting systems.

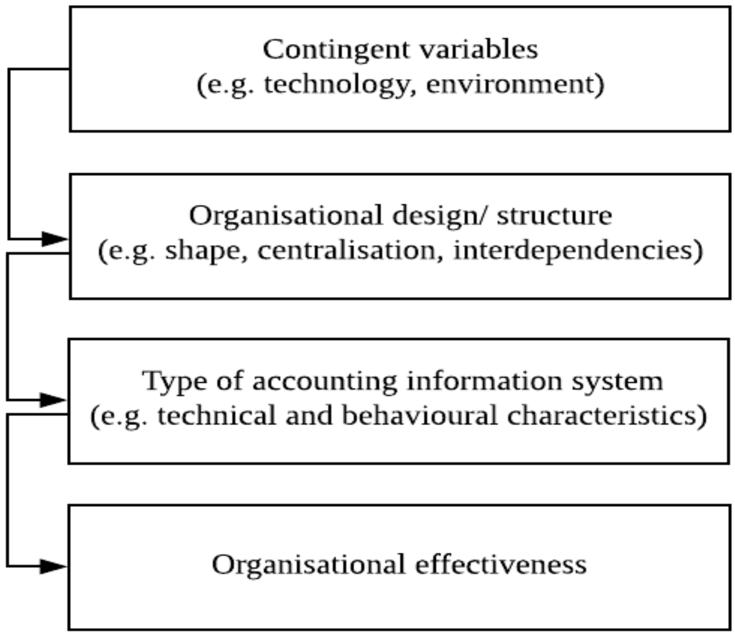


Figure 3.1: A model of contingency research in management accounting system design
(Adopted from Otley, 1980, p. 420)

The four stages above can be applied in many different ways, and not all contingency theory research applies all four stages (Fisher, 1995). For example, some studies in management accounting concentrate only on the relationships between contingent factors and the design of accounting information systems with no attention paid to organisational structure and performance (e.g. Abernethy et al., 2001; Al-Omiri and Drury, 2007; Baird, 2007; Baird et al., 2004; Bjørnenak, 1997; Brierley, 2011; Brown et al., 2004; Drury and Tayles, 2005; Jusoh and Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998; Malmi, 1999; Van Nguyen and Brooks, 1997). Other studies have classified organisational structure under contingent factors, such as Abdel-Kader and Luther (2008), who classified the decentralisation variable in this manner. In addition, a few studies have tested the relationship between contingent factors and the design of accounting information systems and their influence on outcomes such as performance (e.g. Cagwin and Bouwman, 2002; Cohen et al., 2005; Elhamma and Fei, 2013; Ismail and Mahmoud, 2012; Schoute, 2009). Some studies have concentrated only on the design of accounting information systems and performance without testing the fit between contingent factors and costing systems (e.g. Clarke and Mullins, 2001), while other studies have tested the fit between contingent factors and organisational structure (formalisation, centralisation, and differentiation) with ABC adoption (e.g. Schoute, 2004) and with AM usage (e.g. Gosselin, 1997). Taking into account both prior research and the fact that no prior studies in management accounting have applied all four of Otley's (1980) stages, this thesis adopts three of these stages: contingent factors, the type of accounting information system, and organisational effectiveness, though organisational effectiveness is divided into financial and non-financial performance (see Figure 3.2). The next section discusses the categories of contingent factors.

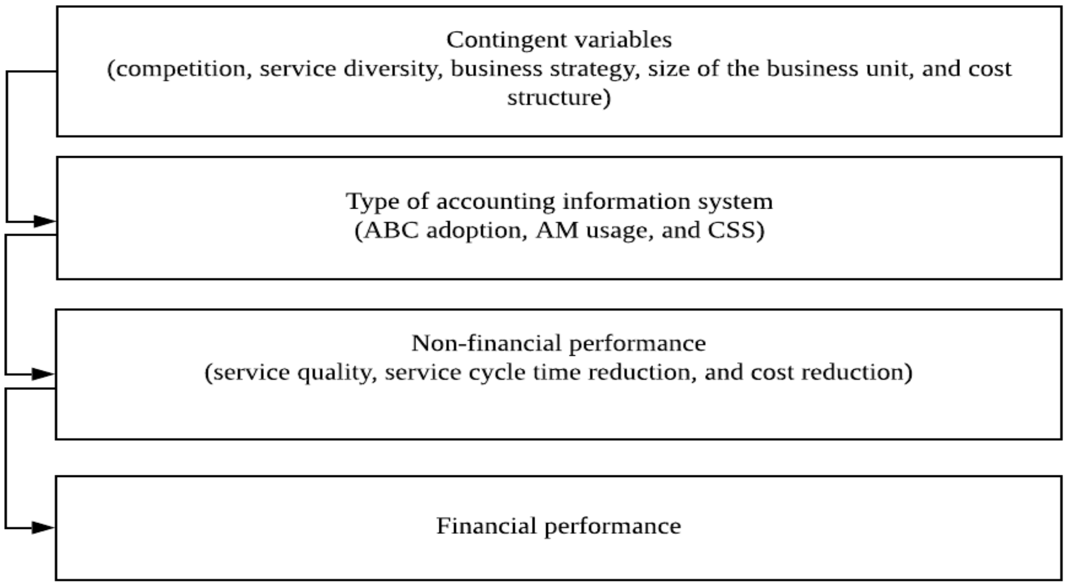


Figure 3.2: A simplified contingency theory-based model

3.4 Contingent factors categories

There are several contingent factors, including cost structure, product diversity, degree of customisation, intensity of the competitive environment, firm size, lean production techniques, and business strategy, that have been predicted to influence ABC adoption, AM usage, and CSS. Fisher (1995) showed that prior research used contingency factors to explain the differences between MCS, suggesting that the major categories of contingent factors are (1) the external environment, (2) competitive strategies, (3) technology, (4) business unit, firm and industry variables, such as firm size, and (5) knowledge and observability factors (see Figure 3.3). These factors were thus adopted and tested in later management accounting studies dealing with ABC adoption, AM usage, and CSS (e.g. Baird, 2007; Brown et al., 2004; Jusoh and Miryazdi, 2015; Schoute, 2009). Fisher's (1995) five contingency factors are therefore discussed in more detail below.

· **The external environment**
- Uncertain and certain
- Static and dynamic
- Simple and complex
- Turbulent and calm

· **Competitive strategy and strategic mission**
- Low cost and differentiation
- Defender and prospector
- Product life cycle mission (build mission, hold mission, harvest mission, and divest mission)

· **Technology**
- Small batch, large batch, process production, mass production
- Interdependence (pooled, sequential, reciprocal)

· **Business unit, firm and industry variables**
- Firm size
- Firm diversification (single product, related diversified and unrelated diversified)
- Organisational structure
- Industry variables

· **Knowledge and observability factors**
- Knowledge of the transformation process
- Outcome (output) observability
- Behaviour (effort) observability

Figure 3.3: Contingent factors grouped by major categories
(Adopted from Fisher, 1995, p. 30)

3.4.1 External environmental factors

External environmental factors influence companies and their organisational performance. These factors exist outside of companies and other organisations, and they thus have no control over them (Daft, 1992). Duncan (1972) classified environmental factors into three main dimensions: (1) the dynamic dimension, (2) the heterogeneous dimension, and (3) the hostility dimension. The dynamic dimension refers to changeability and predictability, specifically to the rate of fluctuation, turbulence, and innovation in industries, the heterogeneous dimension refers to complexity, orientation, and production technology, such as diversity of products, while the hostility dimension refers to the threat levels from competing companies.

3.4.2 Competitive strategy and strategic missions

Business strategy is concerned with how companies deal with business competition and how they gain competitive advantages relative to their competitors (Porter, 1980). The most common strategies used were investigated by Porter (1980) and Miles and Snow (1978). Porter (1980) defined business strategy in two parts, differentiation and cost leadership, while Miles and Snow (1978) classified business strategy followers into prospectors, analysers, and defenders. The classifications of differentiation and prospectors follow the same taxonomy; while cost leadership and defenders can also be considered as the same level of classification (Chenhall, 2003). This occurs as cost leadership and defenders represent firms with low differentiation products and services offered in stable market environments (Gosselin, 1997) who thus aim to reduce research and advertising costs (Miles and Snow, 1978; Porter, 1979); while differentiators and prospectors aim to compete and innovate in terms of their products and services (Gosselin, 1997) as well as to develop their products and services in terms of quality.

3.4.3 Technology factors

Technology factors affect the design of organisations as well as company success. Kast and Gosenzweig (1985, p. 208) thus define technology as "the organisation and application of knowledge for the achievement of practical purposes. It includes physical manifestations such as tools and machines, but also it includes intellectual techniques and process used in solving problems and obtaining desired outcomes". According to Otley (1980), production technology should also be classified under technology factors, as it can influence the design of costing systems. Examples of production technology include unit production and small batch, large batch, and mass production. The production of customised products may be further influenced by the level of overhead costs.

3.4.4 Organisational structure factors

Organisational structure features such as differentiation can be one of the most important contingency factors in contingency theory research (Chenhall and Chapman, 2006). The most common organisational structure typologies in contingency theory research include (1) formalisation, (2) centralisation, and (3) differentiation. Formalisation refers to the roles of the organisation in structuring rules for employees and "the degree to which jobs within an organisation are standardised" (Schoute, 2004, p. 6). Centralisation refers to "the degree to which power and control in an organisation are in the hands of relatively few individuals" (Schoute, 2004, p. 6), and differentiation refers to "the depth of the organisational structure. It reflects the number of hierarchical levels below the chief executive officer" (Schoute, 2004, p. 6).

Four categories of factors, as detailed above, were categorised by Fisher (1995), yet some studies focusing on ABC adoption research add a further category, organisational factors (e.g. Brown et al., 2004; Krumwiede, 1998), and this is also seen in AM usage research (e.g. Baird, 2007; Baird et al., 2004) and CSS research (e.g. Abernethy et al., 2001; Ismail and Mahmoud, 2012; Schoute, 2009). There are thus several different types of organisational factors that act as important contingency variables influencing organisational structure. These factors include the size and age of the organisation, as well as the type of industry. "Organisational factors influence the innovativeness of an organisation and may facilitate or hinder the adopting of ABC" (Schoute, 2004, p. 6).

Management accounting research generally uses contingency theory in an attempt to integrate a range of contingency factors, such as competitive strategy (Schoute, 2009), competition, and product diversity (Al-Omiri and Drury, 2007; Guilding et al., 2005; Ismail and Mahmoud, 2012; Schoute, 2009) into the design of an organisation's cost accounting system. Appendices 1.1, 1.2, and 1.3 show the contingent factors used in each study with regards to ABC adoption, AM usage, and CSS, respectively. Some studies in ABC adoption research also divide these factors into three categories: (1) organisational factors, (2) technological factors, and (3) environmental factors (Schoute, 2004) and these categories can also be used in CSS research (Schoute, 2009). However, some studies on AM usage have used only two categories of factors: (1) organisational factors and (2) business unit culture factors (Baird, 2007; Baird et al., 2004). Other studies about ABC adoption do not use these categories and instead examine the influence of contingent factors on costing systems without classifying each contingent factor into a specific category of contingent factor (e.g. Bjørnenak, 1997; Brierley, 2011; Cohen et al., 2005). A similar approach has been followed in AM usage research (e.g. Gosselin, 1997) and CSS research (e.g. Al-Omiri and Drury, 2007; Drury and Tayles, 2005).

In addition, studies in management accounting tend to adopt different dimensions for each contingent factor. Duncan (1972) classified product diversity under external environmental factors, while other studies have classified it under technological factors (Brown et al., 2004;

Jusoh and Miryazdi, 2015; Krumwiede, 1998; Schoute, 2004). Illustrating this point, Jusoh and Miryazdi (2015, p. 96) stated that "even though a number of prior ABC studies have examined technological and environmental factors, the dimensions of technological and environmental factors in those studies are different from the current study", in other words, the catagorisation of factors is context spesific. Clearly there are several different types of contingent theory categories, and some management accounting research has used these categories, while other studies have not. The researcher has opted not to use these categories, as this research focuses on specific individual factors, rather than factors in a specific category. So, this discussion is purely intended to offer the reader greater knowledge about the definition of contingency theory categories.

The following section will, however, discuss the concept of fit under contingency theory as developed and applied in management accounting research, which is adopted in the current study.

3.5 Concept of fit under contingency theory

There are several different typologies of contingency forms of fit, which can be confusing (Chenhall and Chapman, 2006). Drazin and Van de Van (1985, p. 515) stated that "the key concept in a contingent proposition is fit, and the definition of fit that is adopted is central to the development of the theory, to the collection of data, and to the statistical analysis of the proposition", and Table 3.1 outlines the different forms of fit generally used in contingency theory. Drazin and Van de Van (1985) created typologies of fit that included (1) the selection form of fit, (2) the interaction form of fit, and (3) the system form of fit, while Gerdin and Greve (2008, 2004) and Venkatraman (1989) highlighted two main forms of fit within contingency theory: (1) the moderation form of fit, and (2) the mediation form of fit. Each form of fit in contingency theory applies a different meaning to the theory and to the ensuing empirical results based on the way in which fit is theoretically developed and analysed through statistical testing (Drazin and Van de Van, 1985). The different forms of fit and criticisms of each form are thus discussed in more detail below.

Table 3.1: Forms of contingency fit: abbreviated summary of various typologies
(Adopted from Burkert et al., 2014, p. 8)

Drazin and Van de Van (1985)	Gerdin and Greve (2004)	Gerdin and Greve (2008)	Klaas and Donaldson (2009) Donaldson (2001)
1. Selection fit	1. Congruence fit	1. Congruence fit	1. Managerial choice
2. Interaction fit (No distinction between matching and moderation forms of fit)	2.1 Moderation form of fit 2.2 Mediation form of fit	2.1 Multiplicative form of fit (Distinction between general interaction, symmetrical interaction and cross-over interaction) 2.2 Matching form of fit (Distinction between general interaction, symmetrical interaction and cross-over interaction)	2. Moderation form of fit 2.1 Matching form of fit: 2.2.1 Traditional matching form of fit with iso-performance on the fit line 2.2.2 Neo-contingency's matching form of fit with hetero-performance on the fit line 2.2.3 Matching form of fit asymmetric effects of misfit on performance
3. System fit	-	-	3. Multi fit
-	3. Configuration fit: Distinction between configuration contingency fit and configuration congruence fit	-	4. Configuration fit (Not considered to be part of contingency theory)

3.5.1 The selection form of fit

The selection or congruence form of fit aims to ensure that the relationship between the organisational context, such as its environment, size, and technology level, fits with the organisational structure (Gerdin and Greve, 2004), defined by formalisation, centralisation, and differentiation (Schoute, 2004), without testing whether the context structure fit influences firm performance.

The selection form of fit was developed during the 1960s and 1970s, when some studies into control system design applied the logic of contingency theory without linking the theory with performance, either because the researchers did not measure this or because they were not interested in this part of the theory (Drazin and Van de Van, 1985). Several management accounting studies thus adopted the selection form of fit, including work on ABC adoption, to examine the relationship between contextual variables and ABC adoption, AM usage, and CSS without testing organisational performance. The application of the selection form of fit is still popular in ABC research (e.g. Bjørnenak, 1997; Brierley, 2011; Brown et al., 2004; Jusoh and Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998; Malmi, 1999; Schoute, 2004), AM usage research (e.g. Askarany et al., 2010; Baird, 2007; Baird et al., 2004; Gosselin, 1997), and CSS research (e.g. Abernethy et al., 2001; Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005). The problem with prior selection form of fit research is not the research itself, but that the research did not go far enough to consider the impact of costing systems on performance.

The lack of attention given to the influence of contingent factors and organisational structural fit on organisational performance has been justified from both natural and managerial perspectives (Drazin and Van de Van, 1985). The natural perspective assumes that organisations that operate at high performance levels survive because they are more familiar with their environment or because they have been able to employ gradual adaptation (Drazin and Van de Van, 1985) . This would mean there was no need to test performance when testing the relationship between the organisational context and structure (Drazin and Van de Van, 1985). Another reason offered for this oversight is that the organisations under consideration are in equilibrium, with no expected difference in performance (Burkert et al., 2014). The managerial perspective instead considers the macro-and micro-levels of organisational design (Drazin and Van de Van, 1985), noting that most organisations are constrained in terms of their adoption or choice of organisational structure by their own circumstances. For example, most organisations have different levels of authority, which means that the macro levels of the organisations impose constraints on their micro levels (Drazin and Van de Van, 1985). This would imply that the macro level in the selection form of fit constrains all the structural variables for analysis and contextual fit; however, any structural factors that are not constrained may interact with the organisational context to create expected differences in performance. Examination of interaction form of fit is thus needed to predict performance. Drazin and Van de Van (1985) thus stated that:

> "Future developments of the selection approach to fit in contingency theories may yield promising results if multiple levels of organisational analysis are taken into account. This requires bracketing into two groups structure and process variables that are (1) established at the macro-level, and (2) particularistic at the micro-level. For the first grouping of variables, fit is analysed as a congruence relationship between context and structure and process; for the second group, fit might be analysed as a contingency relationship, using the interaction approach." (Drazin and Van de Van, 1985, p. 517)

Where studies use the selection form of fit based on contingency theory, they assume that all companies are continually optimising their costs systems, regardless of the complexity of those systems. Obviously, not all cost systems are working or are even implemented as well as they could be, and introducing less-than-optimal cost information into a decision-making process may have a severely negative impact on turnover and profits. Abernethy et al. (2001) presented several case studies demonstrating this phenomenon, showing that companies in such situations may be observed and studied, but that it is highly unlikely that any company will have exactly the right MCS in place at all times to perfectly align with the circumstances in which they must operate. This being the case, it is incumbent upon companies to continuously evaluate their MCS, which should include a comparison of the MCS's of other companies operating in similar contexts (Chenhall and Chapman, 2006; Otley, 2016).

3.5.2 The interaction form of fit

As discussed in sub-section 3.5.1, the selection form of fit focuses on understanding the fit between organisational context and structure without testing variations in performance that result from these interactions between context and structure (Drazin and Van de Van, 1985). The interaction or cartesian approach instead tests the effects of interactions between pairs of variables on performance. This means that both individual organisational variables and single contingent factors are examined as independent variables, while organisational performance is set as a dependent variable (Drazin and Van de Van, 1985). The most important part of the interaction form of fit is that the variation of organisational performance can be tested by analysing the interactions between the organisational context and structure. Drazin and Van de Van (1985) visualise this interaction as similar to the effect that the interactions between sun, rain and soil has on agricultural crops, and the interaction form of fit is widely used in academic literature; however, it has had mixed results. Drazin and Van de Van (1985, pp. 518-519) offered this reason: "many researchers have not appropriately operationalised their concepts of fit. In particular, multiplicative interaction terms in regression analyses limit the form of the interaction only to acceleration and deceleration effects, which researchers have not specifically hypothesised in their concept of fit".

Some authors also distinguish between two types of fit in this category, the moderation form of fit and the matching form of fit (Donaldson, 2001; Klaas and Donaldson, 2009), while Gerdin and Greve (2004) designated a third variety: mediation form of fit (see Table 3.1). The moderation and mediation forms of fit are discussed in sub-sections 3.5.4 and 3.5.5, while the matching form of fit is discussed below.

The matching form of fit is part of the moderation form of fit, and this can be broken down into three types (Donaldson, 2001). The first category is the classical, or traditional, matching form of fit, with iso-performance on the fit line and the relationship between MCS factors and organisational performance appearing curvilinear. "The classical matching form of fit predicts several optimal MCS-contingency compensations (matches), each producing the same level of performance" (Burkert et al., 2014, p. 9). The second category involves neo-contingency theory, offering a matching form of fit with hetero-performance on the fit line. This refers to how companies increase their organisational performance as they change their levels of contingent factors (Burkert et al., 2014). The third category of the matching form of fit anticipates an asymmetric influence from any bad fit on organisational performance (Burkert et al., 2014).

3.5.3 The system form of fit

The selection and interaction forms of fit as critiqued in the previous two sub-sections concentrate on testing the fit between single contextual variables and single structural variables and determining how these variables affect performance (Drazin and Van de Van, 1985). Drazin and Van de Van (1985, p. 519) further noted that "This reductionism treats the anatomy of an organisation as being decom-posable into elements that can be examined independently. The knowledge gained from each element can then be aggregated to understand the whole organisational system" (p.519).

Consequently, the system form of fit, multi fit, and holistic forms of fit were created to avoid such reductionism in the selection and interaction forms of fit. The system form of fit utilises several analyses that ensure a fit between the number of contingent contexts, both structural and performance, which are all tested simultaneously (Miller, 1981). To the author's knowledge, the application of the system form of fit in management accounting research is limited as its design requires the selection of the organisational structure that companies use. In addition, this is further impacted by the need to develop the process and structure of contextual factors, multiple structure factors, and multiple performance factors. This means that in terms of management accounting research, the application of the system form of fit may be limited, as this type of fit requires unlimited possible conditions, while companies usually have limits on the number of conditions that can be assigned. Drazin and Van de Van (1985, p. 522) therefore stated that "To identify the feasible set of organisational structures and processes that are effective for different context configurations and to understand which patterns of organisational structure and process are internally consistent and inconsistent".

3.5.4 The moderation form of fit

A moderator variable affects the strength or direction of a relationship between a dependent and independent variable (Venkatraman, 1989). Some authors also classify the moderation form of fit as a part of the interaction form of fit (Donaldson, 2001; Gerdin and Greve, 2004, 2008; Klaas and Donaldson, 2009) (see Table 3.1). Figure 3.4 shows the moderation relationship in more detail. The effect of an independent variable (e.g. different business strategies) on a selected dependent variable (e.g. performance) is contingent on the level of a third variable (i.e. the moderator variable, such as the [management accounting systems] MASs) (Gerdin and Greve, 2004).

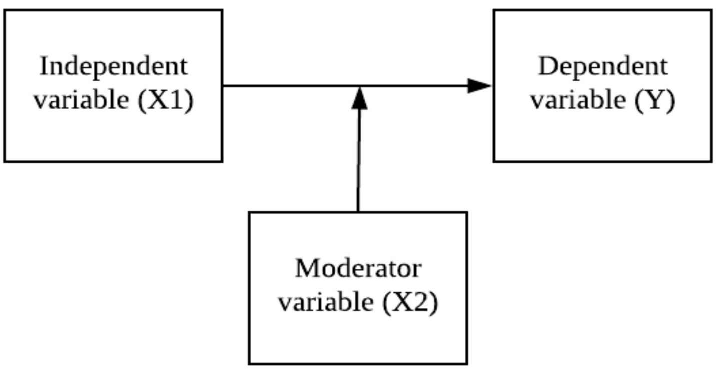


Figure 3.4: The moderation form of fit
(Adopted from Gerdin and Greve, 2004, p. 310)

The moderation form of fit has been applied in several costing systems studies. Schoute (2011) tested the relationship between product diversity and ABC adoption in medium-sized Dutch manufacturing companies as moderated by advanced manufacturing technology (AMT). In terms of CSS studies, Abernethy et al. (2001) tested the relationship between product diversity and CSS, and found this relationship was moderated by AMT. In addition, Cagwin and Bouwman (2002) found that ABC adoption influenced organisational performance when production complexity, just-in-time (JIT), computer integrated manufacturing, value chain analysis, and the importance of cost information were assumed to moderate the relationship.

3.5.5 The mediation form of fit

The mediation form of fit assumes that the influence of the independent variable on the dependent variable is transmitted through a third variable, which is called the "mediator", that plays a role in forming the relationship between the independent and dependent variable, whether in full or partially (Frazier et al., 2004). For example, the indirect effect of organisation size as an independent variable on organisational performance as a dependent variable is developed through a mediation variable such as MAS. Figure 3.5 illustrates this mediation relationship.

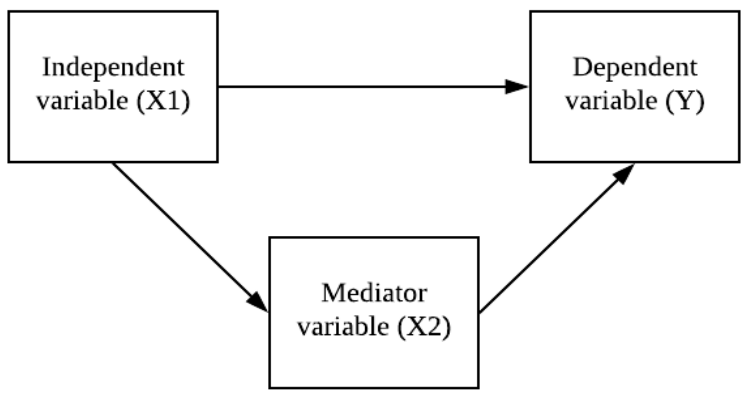


Figure 3.5: The mediation form of fit
(Adopted from Gerdin and Greve, 2004, p. 310)

According to Burkert et al. (2014), true mediation form of fit requires various theoretical and statistical conditions. The theoretical perspective states that the independent variables must be a cause of the dependent variable, and Figure 3.6 outlines the four steps to test this mediation relationship (Baron and Kenny, 1986). The first step tests the direct relationship between independent variables and the final dependent variable; the second step tests the relationship between independent variables and the mediator variable; the third step tests the relationship between the mediator variable and dependent variable; and in the final step, “the direct effect from step 1 needs to become significantly smaller for partial mediation or to disappear entirely for full mediation” (Burkert et al., 2014, p. 13).

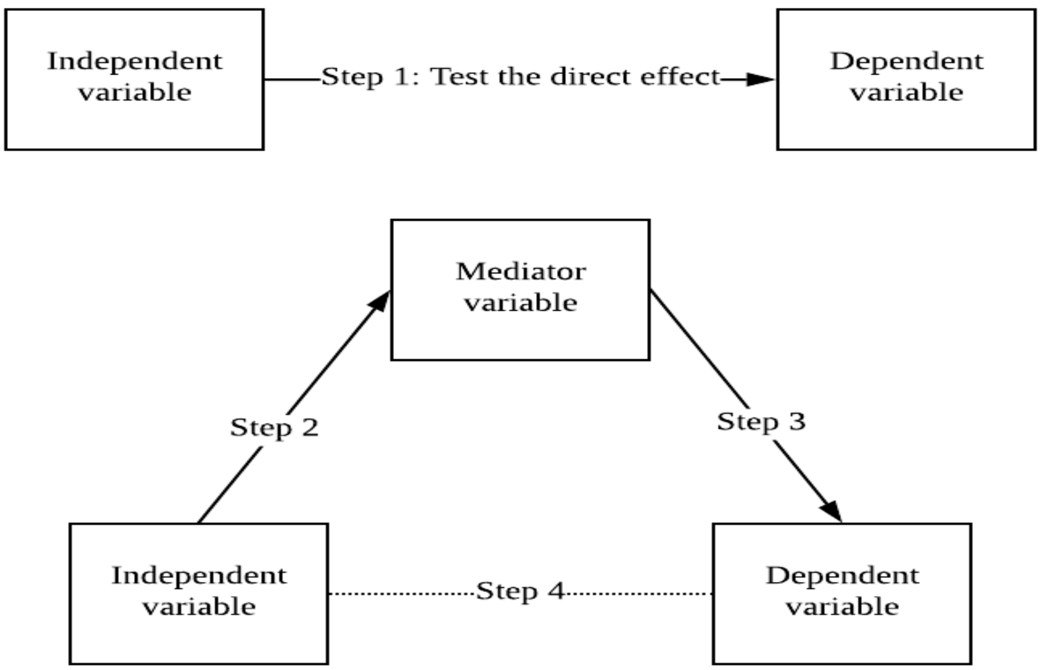


Figure 3.6: Steps to test the mediation form of fit
(Adopted from Baron and Kenny, 1986)

Gerdin and Greve (2004) argued that mediation is simply part of contingency theory, specifically from the interaction perspective. “In MAS research, contingency fit is often analysed by the introduction of a mediating variable. That is, the effect of the independent variable on the dependent variable operates completely or partially through the mediating variable" (Gerdin and Greve, 2008, p. 1004). The interaction form of fit is used less frequently in costing systems research, with selection form of fit the most common means of testing the relationship between a single contingent factor as an independent variable and the product costing system (e.g. ABC). This interaction between the independent and dependent variables has not been incorporated into the current theoretical framework, however, as contingent factors may have influences through other contingent factors on the costing system, such as the effects of interactions between competition and business strategy on ABC adoption, AM usage and CSS.

The mediation form of fit has been criticised in other ways. For example, Burkert et al. (2014) argued that it, together with performance as a dependent variable, does not align with contingency theory, as contingent factors influence the relationship between structure and organisational performance. However, for this theory, contingent factors are not assumed to have a direct influence on performance. Essentially, the mediation form of fit does not recognise different states of fit and misfit between contingent factors and costing systems; for example, if the theory assumes that high levels of competition and ABC adoption are expected to produce high performance results, then the mediation form of fit cannot explain misfit relationships between contingent factors and performance. Burkert et al. (2014, p. 13) thus stated that "mediation models with MCS as the dependent variable can, however, be considered to belong to contingency theory, as this simply represents a more advanced form of selection fit".

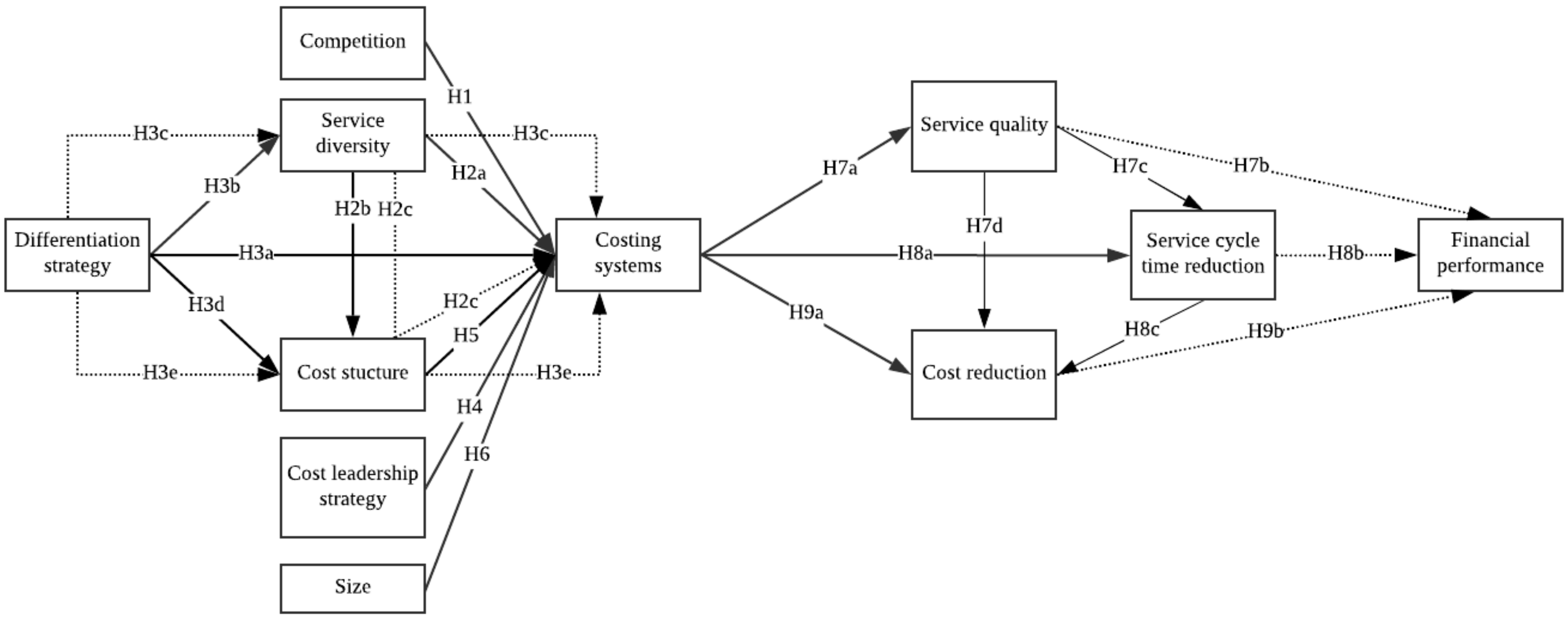
The mediation form of fit has nevertheless been used in ABC studies. Fei and Isa (2010) tested the relationship between ABC adoption and manufacturing and business performance, suggesting that mediation was key to ABC success, while Maiga and Jacobs (2008) found that the effects of quality, cycle time, and cost reduction significantly mediated the relationship between ABC adoption and performance. The mediation form of fit has also been applied in CSS studies, such as that by Schoute (2009), which found that the relationship between CSS and efficiency was mediated by cost management. Highly sophisticated cost systems that are employed for cost management need to be associated with business unit effectiveness in a positive manner.

The application of the mediation form of fit as used in the current research is discussed further in the next section.

3.6 Theoretical research model

The previous section discussed forms of fit in contingency theory and the limitations of each of these. This section now aims to present the theoretical research model for this study, with the aim of helping determine the nature of the relevant research literature, the research objectives, the data collection methodology, and the type of data analysis used (Creswell, 2014). Creswell (2014, p. 119) noted that "theory provides an explanation for the variables in questions and hypotheses in quantitative research". Thus, the current research adopts contingency theory to identify the role of fit in understanding the influence of contingent factors on costing systems as well as to test business unit performance to investigate the effectiveness of costing systems. By doing this, the current research model becomes more comprehensive and furthermore, as prior research has suggested that "the ultimate goal of contingent control research should be to develop and test a comprehensive model that includes multiple control systems, multiple contingent factors, and multiple outcome variables" (Fisher, 1995, p. 24), the current research model links contingency variables with costing systems (ABC adoption, AM usage, and CSS) as well as linking those costing systems with financial performance by examining the mediation role of non-financial performance.

Figure 3.7 reflects this approach and demonstrates the theoretical research model to be tested in the current research. The costing systems construct shown in this theoretical research model reflects each of the three constructs: (a) ABC adoption, (b) AM usage, and (c) CSS, as well as the relationships theorised for these constructs.



Solid lines indicate a direct relationship.
Dotted lines indicate a mediation relationship.

Figure 3.7: Theoretical research model

Based on the theoretical research model presented in Figure 3.7, a number of hypotheses were developed that are empirically tested in order to address the research questions. These hypotheses can be divided into two main groups, the first of which (H_1-H_6) relates to the direct and indirect influence of contingent factors on costing systems; these hypotheses were developed specifically in order to address the first group of research questions *($RQ_{1/2}$ – $RQ_{1/5}$)*. Examining the direct positive influence of contingent factors on costing systems involves the following variables: competition, service diversity, differentiation strategy, size of the business unit, and cost structure. These are expected to have a positive relationship with costing systems (ABC adoption, AM usage, and CSS; H_1, H_{2a}, H_{3a}, H_5, and H_6), while the relationship between cost leadership strategy and costing systems is expected to be negative (H_4). In addition, a positive relationships include a service diversity – cost structure association (H_{2b}), a differentiation strategy - service diversity association (H_{3b}), and a differentiation strategy – cost structure association (H_{3d}), while the indirect relationships are based on the mediation role of cost structure in the relationship between service diversity and costing systems (H_{2c}), the mediation role of service diversity in the relationship between differentiation strategy and costing systems (H_{3c}), and the mediation role of cost structure in the relationship between differentiation strategy and costing systems (H_{3e}).

The second group of hypotheses (H_7-H_9) relates to the direct and indirect effects of costing systems on performance; these hypotheses were developed to address the second group of research questions ($RQ_{2/1}$ – $RQ_{2/4}$). The direct and positive relationships aim to test the influence of costing systems on non-financial performance (H_{7a}, H_{8a}, and H_{9a}), while the indirect relationships aim to test the relationships between costing systems and financial performance based on the mediation role of non-financial performance (H_{7b}, H_{8b}, and H_{9b}). This research aims to test relevant hypotheses about the relationships between non-financial performance factors (H_{7c} refers to a positive relationship between service quality and service cycle time reduction, H_{7d} refers to a negative relationship between service quality and cost reduction, while H_{8c} refers a positive relationship between service cycle time reduction and cost reduction). In order to further support these hypotheses, the next section presents literature used in the development of the hypotheses for this research.

3.7 Research hypotheses development

3.7.1 Competition and costing systems

Each company strives to get consumers to purchase its products and services rather than those of its competitors (Jusoh and Miryazdi, 2015). An appropriate level of competition also helps organisations to take advantage of cost mistakes by other firms (Cooper, 1988b). Cost mistakes include budgeting mistakes and wrong decisions, and they are incurred where simplified costing systems provide incorrect or irrelevant cost information. In ABC adoption research, competition in the market has been seen to affect the value of ABC by increasing the cost of mistakes in tradition costing systems (TCSs). TCSs or ABC system may be appropriate for some organisations but not for others. Some organisations that use TCSs may need more CSS to produce more accurate costs, which could improve the quality of their decision making. Nevertheless, there could be other organisations use TCSs and their systems can meet their needs. In terms of price competition, companies tend to reduce the prices of their products or services to gain competitive advantages, which means that such companies should take the chance to use alternative cost systems, such as ABC, to avoid errors such as over-or under-costing products or services, which can otherwise lead to poor decision-making and which may cause companies to suffer financial losses or lose market share to their competitors (Cooper, 1988b).

The existing empirical results illustrate conflicting findings regarding the impact of competition on the adoption of ABC and CSS studies. For example, in ABC adoption research, some prior research has found a positive relationship between competition and ABC adoption (e.g. Jusoh and Miryazdi, 2015; Malmi, 1999; Van Nguyen and Brooks, 1997); however, Aljabr, (2020), Bjørnenak (1997), Brierley (2011), and Cohen et al. (2005) found no significant relationship between the level of competition and ABC adoption. The varying measurement tools used in these studies may explain these differences in results. For example, Brierley (2011) used a two-item measure based on a five-point Likert scale instrument that reflected the current level of competition for each company's main products and the expected level of competition for those products over the next two years in a study that found no relationship between competition and ABC adoption. On the other hand, Malmi (1999) measured the level of competition based on percentage of export sales, as export companies were found to face more competition internationally than in domestic markets; this study found a positive relationship between competition and ABC adoption. Other examples of CSS research, including Ismail and Mahmoud (2012) and Drury and Tayles (2005), found no relationship between the level of competition and CSS; on the other hand, Al-Omiri and Drury (2007) and Schoute (2009) found a relationship between the level of competition and CSS. This inconsistency of results in terms of relationships between level of competition and CSS is thus most likely due to these inconsistencies in measurement. Indeed, at the most basic level, some studies measured competition in terms of the firm's main products and price competition (Drury and Tayles, 2005; Ismail and Mahmoud, 2012), while others used product competition, price competition and market competition to measure the level of competition overall (Schoute, 2009). Appendix 1.5 shows a comparison of studies testing the relationship between competition and costing systems.

It has been argued that competition can be measured more effectively by assessing multiple items (Hoque, 2011). Within an industry, competition refers not only to the behaviour of current competitors but also the economic structure underpinning such competition.

Competition within an industry thus arises from five essential competitive forces: entry, threat of substitution, bargaining power of buyers, bargaining power of suppliers, and rivalry among current competitors (Porter, 1979). The breadth of these forces reinforces the fact that competition goes beyond the interactions of established leaders in an industry and highlights that forces outside the industry are also significant. Further, although the latter will affect all players equally, they may deal with them in quite different ways, causing differentiation (Porter, 1979). Customers, suppliers, substitutes, and potential entrants can all be seen as affecting competition in one way or another and these factors may be in further flux, depending on the circumstances involved (Porter, 1979). Porter also considered that the broader aspects of competition, were a sort of "extended rivalry", a view which has informed the approach of the current research in terms of utilising a measure that takes a broad view of competition that covers the threat of substitutes, the power of buyers, the power of suppliers, and rivalry among current competitors.

Properly competitive environments encourage organisations to use sophisticated costing systems such as ABC to make optimal decisions (Cooper and Kaplan, 1988a). Examples of such decisions include service design, which may be influenced by the arbitrary measurement of costs (Kaplan and Cooper, 1998). For example, when companies face high levels of competition in non-manufacturing industries, it is possible that service designers may be encouraged to design services that generate fewer costs in order to minimise the total cost for the company. If these types of companies use unsophisticated costing systems, then may mean that they have limited volume-based cost drivers, such as labour hours, and the service designer may just focus on saving labour costs. Where services generate low labour costs yet have high levels of overhead costs, unsophisticated costing systems cannot reduce the cost of services. On the other hand, a sophisticated costing system, such as ABC system, could be able to adequately offer detailed cost information by connecting resource costs with activities that create these costs, after which these overhead costs are allocated to services using cause-and-effect cost drivers. Based on the literature, competition may generally increase the rate at which costing systems are adopted (Jusoh and Miryazdi, 2015; Malmi, 1999; Van Nguyen and Brooks, 1997). This statement is based on the assumption that ABC adoption, along with significant AM usage and CSS, results in more accurate costing systems, permitting companies to enhance their decision-making. Consequently, the following hypothesis is tested:

***H_1*:** The level of competition is related positively to (a) ABC adoption, (b) AM usage, and (c) CSS.

3.7.2 Service diversity and costing systems

Service diversity refers to companies providing different, often customised, services (Bjørnenak, 1997). Schoute (2004, p. 7) noted that "product diversity refers to conditions in which cost objects place different demands on activities or activities place different demands on resources", and as Al-Omiri and Drury (2007) emphasised, many aspects of this, including setup, materials, manufacturing intricacy, assistance, magnitude, and volume, are variable, giving product diversity a multifarious dynamic.

Product diversity has a positive relationship with ABC adoption in the manufacturing industry according to many researchers (Jusoh and Miryazdi, 2015; Khalid, 2005; Malmi, 1999; Schoute, 2004). However, Bjørnenak (1997) and Van Nguyen and Brooks (1997) found no relationship between diversity of products and ABC adoption in the manufacturing industry. In terms of AM usage, Baird et al. (2004) found that product or service diversity has a significant and direct relationship with ABC usage in Australian private manufacturing and non-manufacturing companies. Furthermore, Baird (2007) later reported that product and service diversity has a significant and direct relationship with both ACA and ABC usage in Australian public manufacturing and service companies. In terms of CSS research, Abernethy et al. (2001) and Schoute (2009) found a positive relationship between diversity of products and CSS in manufacturing industry, yet other studies did not find any such a relationship (Al-Omiri and Drury, 2007; Ismail and Mahmoud, 2012). Appendix 1.6 offers a full comparison of studies testing the relationship between product diversity and costing systems.

As discussed, prior studies have offered contradictory findings in terms of the relationship between product diversity and the selection of costing systems. These findings thus clearly have a number of limitations. The first limitation is that inconsistent measurement of ABC adoption have been reported, with some studies using limited methods to measure adoption (Jusoh and Miryazdi, 2015; Malmi, 1999; Schoute, 2004; Van Nguyen and Brooks, 1997).[23] The second limitation is that most prior research has applied only a few, or even single, items to measure product diversity (e.g. Abernethy et al., 2001; Jusoh and Miryazdi, 2015; Khalid, 2005; Malmi, 1999). The third limitation is that the sample size of almost all studies has been small (e.g. Bjørnenak, 1997; Van Nguyen and Brooks, 1997), while the fourth is that most used both manufacturing and non-manufacturing industries and thus did not distinguish between product diversity and service diversity in the same measurement items.[24] By trying to develop a single measure of product and service diversity, researchers may have ignored the fact that there are concepts which are inappropriate to include in single measure. This provides a reason for analysing the data from the manufacturing and non-manufacturing industries separately. The fifth limitation, service diversity, may have an indirect relationship with ABC adoption, as cost structure can explain the indirect relationship between service diversity and ABC adoption by mediating the relationship between service diversity and costing systems. This occurs because increased diversity in each main service and the requirement of different

[23] This issue has been discussed in subsections 1.6.2 and 2.2.1.1.

[24] The measurement of product diversity is different the measurement of service diversity (Alcouffe et al., 2019). As most previous research on costing systems have looked product diversity. I am not aware, however, of any research that has specifically considered service diversity.

designing and service provision processes can increase the level of overhead costs. The service industry is expected to have higher overhead costs than manufacturing industry (Drury, 2018); thus, overhead costs may mediate the relationship between service diversity and costing systems even more strongly than in manufacturing industry.[25]

These limitations mean that further research is needed to test the relationship between service diversity and costing systems, with consideration of the use of (1) an adequate measurement of ABC adoption and non-adoption, (2) multiple items to measure service diversity, (3) a large sample size, (4) a homogenised group (UK non-manufacturing industry), with measures of service diversity being sufficiently different from that of product diversity, and (5) a direct and indirect relationship with cost structure as a mediator.

Product/services diversity refers to differentiated products/services lines, demonstrating the need for businesses to adopt ABC for accurate cost measurement (Al-Omiri and Drury, 2007). This argument is supported by Schoute (2009), who stated that product diversity means that products consume differing proportions of resources and costs, increasing the need for a complex cost system to establish separate cost pools and drivers. The level of product diversity thus positively influences the adoption of ABC, AM usage, and CSS, as product or service diversity exists only where products or services require activities and resources in differing proportions, which in turn creates a need for ABC and CSS to capture a true picture of consumption of activities to avoid product or service cost distortions. Based on this, the following hypotheses are proposed:

***H_{2a}*:** The level of service diversity is related positively to (a) ABC adoption, (b) AM usage and (c) CSS.

[25] The relationship between cost structure and costing systems will be discussed in sub-section 3.7.4.

***H_{2b}*:** The level of service diversity is related positively to cost structure.

***H_{2c}*:** The impact of the level of service diversity on (a) adoption of ABC, (b) AM usage, and (c) CSS is mediated positively by cost structure.

3.7.3 Business strategy and costing systems

It is important for organisations to define clear strategies to measure achievement. For instance, a company may plan to introduce new services, and, in such a case, the company's strategy must identify and describe the types of services to be provided and customers to be targeted. Business strategy guides a company with respect to its structure, environment, and processes (Hambrick, 1980), yet the relationship between business strategy and ABC adoption depends on which strategy is used.

Porter (1980) defined business strategy as the ways in which an organisation competes in the market and gains advantages over competitors, suggesting two main types of strategies: cost leadership and differentiation. Organisations that use cost leadership strategies tend to provide products at lower prices than their competitors; in addition, companies that follow this type of strategy tend to have low product diversity and high-volume production (Porter, 1980). Organisations that use differentiation strategy tend to distinguish their services and products from those of their main competitors in other ways; these companies thus frequently offer high product diversity and low production volumes. A differentiation strategy can provide unique products or services, further developing a company's brand image, dealer network, and customer service levels (Porter, 1980). Based on previous literature addressing the costing systems, discussed below, it is possible to conclude that companies which use a differentiation strategy may be more likely to adopt CSS techniques such as ABC.

Malmi (1999) applied Porter (1980) to investigate relationships between cost leadership or differentiation strategy and ABC adoption; but did not find a relationship between either of the strategies and ABC adoption. In addition, Elhamma and Fei (2013) and Frey and Gordon (1999) found that business strategy, whether in terms of cost leadership or differentiation, had no impact on ABC adoption. For organisations that apply cost leadership reduced costs and controlled overhead spending, resulting in low product diversity and causing them to tend to use TCSs (Malmi, 1999).

Frey and Gordon (1999) noted that ABC implementation was connected with enhanced financial performance in companies adhering to a differentiation strategy compared to companies adhering to cost leadership strategies. Differentiation strategy requires more information than cost leadership strategies, as companies that seek to apply them must invest in new product innovation, research and development expenditure, and proper analyses of marketing costs (Shank, 1989). Product innovation increases overhead costs and hence increases cost allocation issues, which implies that ABC adoption can help with product innovation by providing more accurate product costs and thus allowing for better activity management (Hadid, 2019). It can also help businesses that use differentiation strategy by enhancing their knowledge of the value drivers that serve product or service differentiation. "Improving existing processes, manufacturing systems innovations and activity-based techniques were important for high-performing firms emphasising product differentiation strategies" (Chenhall and Langfield-Smith, 1998, p. 255). ABC thus not only helps to manage cost levels but also increases a company's understanding of value-added activities that enhance the differentiation of its products (Hadid, 2019).

A study by Gosselin (1997) involved examining how competitive strategies impact the use of AM in the manufacturing industry and observed that companies that implement differentiation strategy often implemented innovative systems including ABC compared to cost leadership strategies as more resources were required in differentiation strategy in terms of innovation and experimentation. Hence, companies that implement differentiation strategy have more sophisticated costing systems, like ABC. Thus, they can compute product or service costs more accurately because the diversity resulting from the differentiation strategy generates the necessity for a more robust costing systems for recording costs precisely and ensuring that there is no over-or under-costing. Further, a sophisticated costing system offers the additional benefit of the revenue from products or services surpassing the costs of implementing the selected differentiation strategy. Appendix 1.7 offers a comparison of studies testing the relationship between business strategy and costing systems.

These prior studies have reported contradictory findings in terms of the relationship between business strategy and the adoption of costing systems. The findings reported by these studies thus have a number of clear limitations. The first is that most previous research focuses on the relationship between business strategy and limited methods to measure adoption (e.g. Elhamma and Fei, 2013; Jusoh and Miryazdi, 2015; Malmi, 1999; Schoute, 2004).[26] The second is that prior research has generally used a single item to measure business strategy (e.g. Gosselin, 1997; Malmi, 1999). The third and final limitation is that although these studies did not find any relationship between differentiation strategy and ABC adoption, there was no consideration of a possible indirect relationship created by service diversity and cost structure as mediators.

Gosselin (1997) pointed out that firms who are looking to compete may do so by looking at their customers and considering how they make choices, then adapting to fit those customers' needs by rapidly making changes to improve relevant aspects of the product or service, including branding and design, as well as product quality. Porter (1980) advised that companies may also look to compete in new ways, including generating changes in their industry, creating

[26] This issue has been discussed in subsections 1.6.2 and 2.2.1.1.

new opportunities, and identifying how new and innovative services can be introduced to customers in ways that they value. A differentiation strategy may have a direct relationship with service diversity which, in turn, can mediate the relationship between differentiation strategy and ABC adoption. In addition, previous studies have found inconsistent results in terms of a differentiation strategy and ABC adoption as they have not taken into account the mediation role of cost structure. Companies that use a differentiation strategy in non-manufacturing industry provide unique services that generally have higher overhead costs. A differentiation strategy may thus have a direct relationship with cost structure, which in turn could mediate the relationship between differentiation strategy and ABC adoption.

Based on these existing limitations, further research is needed to test the relationship between business strategy and costing systems in terms of (1) ABC adoption, AM usage, and CSS, (2) the use of multiple items to measure business strategy, and (3) an examination of both direct and indirect relationships between level of service diversity and cost structure in order to overcome the limitations reported in prior studies. The following hypotheses were thus formulated and tested:

***H_{3a}*:** The differentiation strategy is related positively to (a) ABC adoption, (b) AM usage and (c) CSS.

***H_{3b}*:** The differentiation strategy is related positively to service diversity.

***H_{3c}*:** The impact of differentiation strategy on (a) ABC adoption, (b) AM usage and (c) CSS is mediated positively by the level service diversity.

***H_{3d}*:** The differentiation strategy is related positively to cost structure.

***H_{3e}*:** The impact of differentiation strategy on (a) ABC adoption, (b) AM usage and (c) CSS is mediated positively by cost structure.

H_4**:** The cost leadership strategy is related negatively to (a) ABC adoption, (b) AM usage, and (c) CSS.

3.7.4 Cost structure and costing systems

According to Bjørnenak (1997), companies that have high overhead cost percentages must implement ABC, which was affirmed by Van Nguyen and Brooks (1997) who also stated that ABC must be implemented by every organisation with high overhead costs compared with their total costs. This is because simple TCSs use only a few cost pools and cost drivers, and this parsimony can cause serious distortion in reported costs. The minority of previous studies examined the relationship between levels of manufacturing overhead costs and total manufacturing costs, both with and without ABC adoption, and these studies found a clear positive relationship between higher manufacturing overhead costs and total manufacturing costs with ABC adoption (e.g. Bjørnenak, 1997; Jusoh and Miryazdi, 2015; Krumwiede, 1998). However, other studies (e.g. Aljabr, 2020; Brierley, 2011; Cohen et al., 2005; Khalid, 2005; Malmi, 1999) could not replicate this association. In relation to AM usage, Baird et al. (2004) found that a direct and significant relationship exists between cost structure and both ACA and ABC usage in Australian private manufacturing and service companies, while Baird (2007) reported a relationship between cost structure and ABC usage in Australian public manufacturing and service companies.

In the literature pertaining to CSS, high levels of overhead costs have been noted as resulting in organisations using complex costing systems to assign indirect or overhead costs more accurately to products and services, as well as to avoid the distortion of product or service cost information (Drury and Tayles, 2005). As the percentage of overhead costs in manufacturing industry is lower than that of direct costs (Drury, 2018), there is less need for sophisticated costing systems, however, and some studies did not find a relationship between cost structure and CSS in such cases (Al-Omiri and Drury, 2007; Ismail and Mahmoud, 2012). Nevertheless, in non-manufacturing industries, the expected levels of overhead costs are higher than those for direct costs, so there is greater need for CSS (Drury, 2018). Appendix 1.8 shows a comparison of studies testing the relationship between cost structure and costing systems.

Variations and limitations in the measurement tools used in each study with regard to ABC adoption, AM usage, and CSS may be responsible for many of the inconsistencies in results. For example, some studies used production and non-production overhead costs as compared to total costs to measure costing structures (Cohen et al., 2005), while others used the percentage of manufacturing overhead costs as compared to the total manufacturing costs (Brierley, 2011). Another reason for the discrepancy could be that different measurements of ABC adoption and non-adoption were used in different studies, leading to inconsistent results in terms of the relationships between overhead costs and ABC adoption. Moreover, a focus on both industries also might have led to different findings, as the overhead costs for non-manufacturing companies are generally higher than those of manufacturing companies due to the lower material costs for service companies; in addition, in manufacturing companies, important components such as direct material and labour hours can be more easily traced to individual products (Drury, 2018). This makes the need to adopt ABC in non-manufacturing companies greater (Szychta, 2010), which leads to the following hypothesis:

***H*$_5$:** The level of indirect costs is related positively to (a) ABC adoption, (b) AM usage, and (c) CSS.

3.7.5 Size of the business unit and costing systems

Large companies generally have larger networks of communication channels as well as having more resources to develop and operate innovative costing systems (Al-Omiri and Drury, 2007; Krumwiede, 1998). These resources can lead them to adopt greater levels of CSS, including ABC (Drury and Tayles, 2005). Large companies also tend to have diverse and complex facilities, including extensive marketing departments, product development experience, and research capabilities (Nord and Tucker, 1987). Van Nguyen and Brooks (1997) stated that large business units are thus more likely to adopt ABC than small companies, as the application of ABC is costly and requires external consultation and extensive training; large companies are therefore more likely to operate on this higher economic scale.

Typically, the business unit size is assessed by considering factors such as number of employees, net worth of firm, total assets, and annual sales revenue. Previous studies in management accounting have noted that the size of the business unit is positively related to ABC adoption (e.g. Bjørnenak, 1997; Brierley, 2011; Cagwin and Bouwman, 2002; Krumwiede, 1998; Malmi, 1999; Van Nguyen and Brooks, 1997). This positive relationship may be because larger companies have access to more resources for generating innovative systems including ABC (Bjørnenak, 1997). On the other hand, both Schoute (2004) Cohen et al. (2005) failed to find any relationship between ABC adoption and the size of the business unit. Such contradictory results could be resulting from using diverse measurement tools.

Forsaith et al. (1995) stated that a stable way of measuring the company size is the number of employees and not measures such as sales, because external factors such as international exchange rates can affect them. Studies on costing systems, however, continue to provide inconsistent results when using the number of employees as a measure of size for examining organisational size's relationship with ABC adoption (e.g. Bjørnenak, 1997; Brown et al., 2004; Schoute, 2004), in CSS studies (e.g. Ismail and Mahmoud, 2012; Schoute, 2009) or in AM usage studies (e.g. Askarany et al., 2010; Baird et al., 2004). Further, inconsistent results are also observed in studies that used both the number of employees with sales revenue as measures of organisational size in terms of implementing ABC (e.g. Cohen et al., 2005; Malmi, 1999).

On the other hand, other studies show a consistent link between ABC adoption and organisational size in cases where only sales revenue is used as a measure of organisational size (e.g. Cagwin and Bouwman, 2002; Krumwiede, 1998), which was also observed in CSS research (e.g. Al-Omiri and Drury, 2007; Drury and Tayles, 2005). The fact that sales revenue indicates a company's resources suggests that greater revenue leads to the availability of higher finance resources for adopting ABC or CSS. Appendix 1.9 compares those studies testing the relationship between size of the business unit and costing systems.

Previous studies in this area have focused either on manufacturing, or on both manufacturing and non-manufacturing industries; there is a lack of literature on the influence of size of the business unit in non-manufacturing industry with regard to ABC adoption, AM usage, and CSS. This relationship is, nevertheless, expected to be positive when size of the business unit is measured based on total sales revenue, capital employed, and total number of employees. Capital employed can be defined as the total amount of capital used for the acquisition of profits (Hawawini et al., 2003), and it is often used to measure the size of a business unit in management accounting research (Hoque, 2000). Non-manufacturing industry depend to a greater extent on human resources rather than machinery as compared with the manufacturing industry, however (Drury and Tayles, 2005), and thus the number of employees may be regarded as being even more indicative of company size in such cases. The current research thus uses the number of employees, sales revenue and capital employed as measures of size of the business unit in non-manufacturing companies, preventing reliance on one aspect of size alone. The underlying reason for this is that non-manufacturing companies rely upon worker power to develop complexity, as well as on cash or revenues to provide resources; thus, these two elements adequately capture size of the business unit. Based on this, the following hypothesis is proposed:

***H*$_6$:** The size of business unit is related positively to (a) ABC adoption, (b) AM usage and (c) CSS.

3.7.6 Costing systems, service quality and financial performance

Several researchers have tested the relationship between ABC adoption and financial performance, including return on investment (ROI) (Cagwin and Bouwman, 2002) and return on assets (ROA) (Ittner et al., 2002). ROI is the percentage of benefit or return on an investment as compared to the cost of the investment (Drury, 2018), and this ratio is widely used by companies to evaluate the performance and efficiency of a single division or investment, or to compare the performance and efficiency of several different divisions or investments. Cagwin and Bouwman (2002) determined that ABC affects organisational performance, including ROI, when various moderating variables (information technology, competition, firm process complexity, cost significance, intra-company transaction, and low-use capacity) are allowed to influence this relationship. Jänkälä and Silvola (2012, p. 499) tested the relationship between ABC adoption and financial performance for the "financial performance measures of growth (measured by the growth in net sales) and profitability (measured by ROI)". Their study found no relationship between ABC adoption and ROI. They concluded that the "effects of ABC may not be visible in financial performance immediately after adoption, and it may take even several years before any improvements in financial performance are achieved" (Jänkälä and Silvola, 2012, p. 517).

Thus far, no studies in management accounting have examined the service quality's relationship with financial performance metrics such as net sales and ROI, while the majority of studies have taken place in marketing research. Although numerous studies have determined that product quality is related to financial performance (Lakhal and Pasin, 2008; Maiga and Jacobs, 2007; Nelson et al., 1992). Some studies observed that product quality and financial performance are positively related (Dale and Lightburn, 1992), others could not confirm this

(Gale, 1994). In addition, Mellat Parast and Fini (2010) examined service quality's relationship with financial performance (profitability) by focusing on the airline industry and did not observe any connection between quality and profitability. A study by Maiga and Jacobs (2007), however, found that service quality was positively related to profitability and that high-quality services resulted in decreased production as well as rework costs, which was also affirmed by Nelson et al. (1992) who evaluated service quality's relationship with financial performance (ROA) by focusing on hospitals and observed that the quality of nurse service was positively related to ROA. In addition, Rust et al. (1995) noted that enhancing the service quality has a positive impact on profitability as it improves customer satisfaction as well as retention rates and increases market share and revenue, thus reducing costs, increasing profitability, and attracting new customers.

Service quality has been described as those attributes reflecting a company's ability to meet customer needs (Parasuraman et al., 1985). Generally, ABC provides information about activities and cost drivers, which can increase quality by identifying non-contributory activities or poor products caused by poor decision quality (Maiga and Jacobs, 2008). According to Ismail and Mahmoud (2012), CSS is positively associated with product quality, as CSS can produce extremely accurate cost information by using non-value added activities. Some examples of this include monitoring, recording, or moving work processes, which can lead to increases product and/or services quality. Previous research has tested the relationship between ABC adoption and the improvement of financial performance yet found no relationship between these two variables (Ittner et al., 2002; Jänkälä and Silvola, 2012; Maiga and Jacobs, 2007). This may be because the influence of ABC adoption on financial performance takes time to become discernible and it can also be an indirect relationship, using service quality as a mediator. In addition, a higher level of service quality is likely to lead to a higher demand

and sales of services, which will have a positive impact on financial performance (Rust et al., 1995). . Based on this, the following hypotheses are proposed:

H_{7a}: (a) ABC adoption, (b) AM usage, and (c) CSS are related positively to improvements in service quality.

***H_{7b}*:** The impact of (a) ABC adoption, (b) AM usage, and (c) CSS on financial performance is mediated positively by service quality.

The relationship between product quality improvement and cycle time reduction has previously been analysed from two different perspectives. The first view is that high-quality products require longer cycle times as they are more complex to produce (Ittner, 1994; Maiga and Jacobs, 2007), while the other is that high-quality products actually reduce cycle time, having fewer defects and a reduced need for repairs or rework, which might otherwise lead to delays in processing and delivery (Nandakumar et al., 1993). To the author's knowledge, there is no research that tested the relationship between service quality and service cycle time reduction in non-manufacturing industries; however, high-quality service in non-manufacturing industries, such as healthcare or education, is expected to have a positive effect on cycle time reduction, as high-quality service providers may have the experience to deliver services to customers over a shorter time frame. This idea is captured in the following hypothesis:

***H_{7c}*:** Service quality is related positively to service cycle time reduction.

On the other hand, an increase in a product quality can decrease costs where high-quality products may reduce the costs incurred by defects and reworking (Harter et al., 2000). Product quality may be tangibly measured, yet service quality is more challenging to measure, being primarily dependent on customers' perceptions (Grover et al., 1996). Schonberger (1980, p. 25) stated that, "measuring the quality of intangible purchases is the central problem that makes purchasing intangibles a special challenge". To the author's knowledge, there is no research on the relationship between service quality and cost reduction in the non-manufacturing industry. High-quality services may save on the cost of reworks or repairs, but they remain intangible products, and increasing service quality can be expected to increase costs, as experienced, qualified service providers generally require higher salaries. Thus, high service quality often involves increased costs. Thus, the improvement of service quality cannot led to cost reduction. The following hypothesis is thus proposed:

***H_{7d}*:** Service quality is related negatively to cost reduction.

3.7.7 Costing systems, service cycle time reduction and financial performance

Improvements in cycle time enhance firms' abilities to provide products or services in a timely manner (Ittner et al., 2002). Fei and Isa (2010) and Ittner et al. (2002) studied the relationship between ABC adoption and improvements in product cycle time in manufacturing companies, identifying a positive relationship between ABC adoption and cycle time reduction. ABC provides information in relation to activities that do not add value to production, such as moving, counting, and checking, which can unnecessarily increase the duration of the production process. Thus, ABC can help companies minimise delays by providing additional information about value-added and non-value-added activities, allowing the latter to be minimised. Improving cycle time can help avoid delays or late orders, which in turn, can increase customer loyalty and profitability; thus, cycle time reduction translates into bottom-line profit increases (Sharland et al., 2003). Maiga and Jacobs (2007) support this idea; their study found a positive relationship between product cycle time reduction and financial performance metrics such as ROA and return on sales (ROS).

The relationship between ABC adoption and the improvement of financial performance has been tested in prior research, with no relationship being found between them (Ittner et al., 2002;

Jänkälä and Silvola, 2012; Maiga and Jacobs, 2007). This could be due to the influence of ABC adoption on financial performance taking time and the indirect relationship derived from using improvement of service cycle time reduction as a mediator. Based on this, the following hypotheses are proposed:

***H$_{8a}$*:** (a) ABC adoption, (b) AM usage, and (c) CSS are related positively to service cycle time reduction.

***H$_{8b}$*:** The impact of (a) ABC adoption, (b) AM usage, and (c) CSS on financial performance is mediated positively by service cycle time reduction.

Service cycle time reduction can include all processes undertaken by companies to complete their products and/or services. One way to reduce costs can thus be to decrease cycle times, as cycle time reduction leads to reducing both non-value-added activities and product costs (Ittner et al., 2002). Reducing cycle time involves removing any nonessential steps, which can also lower labour and machine costs. This assumption also applies to non-manufacturing industries, reducing the cycle time of intangible product processes can be achieved by cutting non-value-added time or combining steps in service provision to decrease costs (Campell, 1995). Based on this, the following hypothesis was developed:

***H$_{8c}$*:** Service cycle time reduction is related positively to cost reduction.

3.7.8 Costing systems, cost reduction, and financial performance

Cost reduction is a process applied by companies to reduce costs without harming profits (Spence, 1984).[27] ABC adoption is one such way to reduce costs (Anderson and Young, 1999),

[27] Some studies have classified cost reduction under organisational performance (Hoque, 2005) and others have classified three linked factors (quality, cycle time reduction and cost reduction) under operational performance (Ittner et al., 2002), while a third group have classified cost reduction as a non-financial factor (Ainin et al., 2015). These three factors are most closely aligned with long-term organisational strategies, allowing measurement of non-financial performance as a separate construct.

as ABC provides information about value-added and non-value-added activities, including the costs associated with them, which helps employees, managers, and accountants, to reduce costs by eliminating those activities that do not add value to consumers or by minimising the number of activities required to produce products (Ittner et al., 2002). However, Ittner et al. (2002) did not find a significant relationship between ABC adoption and changes in manufacturing costs.

It is possible to minimise costs by enhancing the quality of the product or service, which can improve customer satisfaction. Several companies have implemented advanced computation as well as communication networks including internet and wireless connections to improve their profits and decrease costs (Wheeler and Chambers, 1992). Further, cost reduction programmes may help in directly transferring savings to the bottom line (Rust et al., 2002). As noted by Amit (1986), the application of cost leadership strategies is positively related to improved market share. Companies having high market shares can thus provide products or services at low prices which cane enhance productivity as per the precepts of economies of scale (Porter, 1980).

The relationship between ABC adoption and improvement in financial performance has been tested in several research works, but no relationship has been found between these two variables (Ittner et al., 2002; Jänkälä and Silvola, 2012; Maiga and Jacobs, 2007). This could be because the influence of ABC adoption on financial performance can take time to become apparent, as well as potentially being an indirect relationship with cost reduction as a mediator. As ABC adoption or high-level CSS depend on many second stage cost drivers, many of which can reduce the overhead costs of the service provided. The reduction of costs tends to be noticed by companies earlier, and these benefits can, in turn, influence a company's financial performance. Based on the above argument, the following hypotheses are proposed:

***H$_{9a}$*:** (a) ABC adoption, (b) AM usage, and (c) CSS are related positively to cost reduction.

***H_{9b}*:** The impact of (a) ABC adoption, (b) AM usage and (c) CSS on financial performance is mediated positively by cost reduction.

3.8 Conclusion

In this chapter, the concept and variable categories of contingency theory were discussed in relation to the existing costing systems literature; in addition, the various forms of fits and the criticisms of each form were offered. Based on this discussion, the current research adopts the mediation form of fit in its theoretical research model, and several hypotheses have been developed, including six contingent factors considered to have direct and indirect relationships with (a) ABC adoption, (b) AM usage, and (c) CSS. These contingent factors are competition, service diversity, differentiation strategy, cost leadership strategy, cost structure, and size of the business unit. The indirect relationships between contingent factors and (a) ABC adoption, (b) AM usage, and (c) CSS are best explained by the mediation form of fit, with cost structure mediating the relationship between service diversity and (a) ABC adoption, (b) AM usage, and (c) CSS; furthermore, service diversity and cost structure could also mediate the relationship between differentiation strategy and (a) ABC adoption, (b) AM usage, and (c) CSS. The developed theoretical research model aims to determine the relationships between (a) ABC adoption, (b) AM usage, and (c) CSS, and their influences on financial and non-financial performance. The next chapter thus discusses the research methodology and methods used to achieve this.

Chapter 4: Research Methodology and Methods

4.1 Introduction

The previous chapter presented the theoretical framework and the research hypotheses for this work, while the current chapter covers the methodology and methods used to address the 15 research questions outlined in section 1.3. This chapter also discusses the rationale for selecting a positivist paradigm and a quantitative design supported by supplementary interviews for this study, and identifying the potential advantages and challenges associated with the adoption of this methodological approach. This chapter contains the following five additional sections: section 4.2 briefly discusses the philosophical assumptions, alongside a discussion of the research paradigm underpinning the current research. Section 4.3 outlines the different methodologies available and the research methodology supporting the collection of the required data in this case. Section 4.4 presents the data collection methods used in this study, with sub-section 4.4.1 focusing on the quantitative survey questionnaire data collection method and its application in the current research, and sub-section 4.4.2 presenting information on the supplementary qualitative interview data collection method. Section 4.5 then discusses the ethical considerations arising from this research, and the final section (4.6) contains the conclusion of the chapter.

4.2 Philosophical assumptions

According to Easterby-Smith et al. (2001), there are three reasons why understanding philosophical concepts may make research design more efficacious: it facilitates research design clarification; an understanding of philosophy can assist researchers in determining and acknowledging those designs that will facilitate or challenge their studies; it reduces the possibility of the research proceeding down useless or unproductive paths and highlighting any research limitations. Philosophical knowledge can, despite any limitations of previous experience, assist research designers in generating original and relevant research designs. Easterby-Smith et al. (2001) thus believed that it can aid research design adaptation based on an understanding of extant knowledge structures.

According to Collis and Hussey (2014), the means by which a researcher comprehends, perceives and attains the necessary knowledge for a study is research philosophy. The research philosophy, as the research paradigm chosen by the researcher when they undertake the research project, determines the choice of research method such as experiment, case study or survey (Creswell, 2014). Assumptions concerning reality and the perception of such reality thus form the foundation on which researchers can attain their aims (Collis and Hussey, 2014). This foundation or paradigm can subsequently be categorised as a theoretical or philosophical framework, and this section discusses the different philosophical assumptions underlying the two main dimensions of this: ontology and epistemology.

4.2.1 Ontological assumptions

Collis and Hussey (2014) noted that the nature of reality is the concern of ontological assumptions. The positivist outlook takes an external and objective reality as representing social reality (Creswell, 2014). "Positivists believe valid knowledge can be generated only from objective empirical observation experienced through the senses and carried out according to the scientific method" (Moon and Blackman, 2014, p. 1168). In contrast, interpretivists believe that individuals have consciousness only because each individual holds a personal conception of the world (Collis and Hussey, 2014); being socially constructed, any social reality is thus a subjective phenomenon in interpretivist reality.

This thesis employs ontological objectivism as a research approach, and a belief in a single objective reality or "truth" is acknowledged and maintained throughout the study. It is therefore assumed in this research that any phenomenon, such as the relationship between contingent factors and costing systems or the relationship between costing systems and performance, exists regardless of people's awareness of it.

4.2.2 Epistemological assumptions

Epistemology asks the following question: what is the relationship between the researcher and that which is being researched? (Creswell, 2014). How individuals accept the validity of knowledge is the main concern of epistemological assumptions (Collis and Hussey, 2014), which therefore define how knowledge can be produced and argued for, including the criteria by which knowledge is made possible, what kind of knowledge is available, and what the limits of such knowledge are (Creswell, 2014).

There are two different epistemological standpoints, epistemological positivism and epistemological interpretivism, which emerge from the two contentious assumptions made by ontological objectivism and ontological subjectivism (Bryman and Bell, 2015; Collis and Hussey, 2014). These two paradigms are thus discussed further in the following sub-sections.

4.2.2.1 Positivist paradigm

As previously discussed, the positivist paradigm argues that, regardless of researchers' beliefs or perspectives, any research situation arises within a single objective reality (Moon and Blackman, 2014). Given the positivist point of view, researchers must adopt a structured means of doing research, including research topic identification, hypothesis formulation, and the application of appropriate methodology for the research proposed (Moon and Blackman, 2014). Positivism relies mainly on deductive approaches with quantitative designs rather than inductive approaches using qualitative designs (Collis and Hussey, 2014).

4.2.2.2 Interpretivism paradigm

Where subjective ontological assumptions are made, researchers will favour an interpretivist epistemology. Interpretivism, which usually takes an inductive approach, explains human behaviour through the examination of individual cases (Moon and Blackman, 2014). Interpretivism thus derives outcomes from the interactions between participants and researchers, and final results depend on the cultural and historical location of the participants and the area of research (Collis and Hussey, 2014). Collis and Hussey (2014) noted that an interpretive paradigm typically adopts an inductive reasoning approach, and such researchers tend not to draw upon theoretical frameworks when initially examining a phenomenon. Instead, Creswell (2014) noted that such frameworks are advanced at the latter stages of research to underpin and support the topic subjected to analysis.

4.2.2.3 Classification of the current research

For the purposes of the current study, a positivist, rather than an interpretivist, paradigm was selected, as the assumptions on which the former philosophical approach is founded are more relevant to this research. The objectives of this research are to test hypotheses related to contingent factors, activity-based costing (ABC) adoption, activity management (AM) usage, and cost system sophistication (CSS).[28] These hypotheses present a single reality, and the researcher aims to observe the relationship between variables based on the assumption that the researcher's investigations of these phenomena will not have any influence on those relationships. This rational supposition, based on objectivity and impartiality, leads to the adoption of a deductive approach, with the intent of theory confirmation, and the use of formal language that is passive rather than subjective in nature (Collis and Hussey, 2014). Positivist research, to a large extent, relies on mathematical and statistical techniques to develop

[28] These hypotheses are presented in full in chapter 3, section 3.7.

structured methods to identify truths about objective reality (Bryman and Bell, 2015). Using a foundation of the extant literature of contingency theory, the researcher was thus able to develop a theoretical model and relevant hypotheses before seeking to verify their validity through empirical means.

4.3 Research methodology: quantitative design with supplementary interviews

The general approach utilised for a piece of research is known as the methodology. Different methodological approaches are generally utilised based on the different philosophical assumptions made by researchers. As in ontology's objective-subjective debate and in epistemology's positivist-interpretivist dichotomy, a similar debate regarding quantitative and qualitative design thus emerges when considering methodology.

Various methodologies have been adopted to gather costing systems information, though one of two broad methodology types are typically applied, namely qualitative design, which relies upon field studies or case study examples, and quantitative design, in which a survey format is generally employed. Creswell (2014) differentiated between these approaches by noting that qualitative studies primarily focus on the in-depth exploration of the phenomena under study, while quantitative research design establishes whether, and to what degree, a correlation exists between certain variables. The current research was undertaken for theory testing purposes, requiring significant volumes of cross-sectional data to test the hypotheses proposed. A quantitative survey-based design as opposed to a qualitative research design was thus deemed to be most suited to gather this data. The following sub-section therefore both assesses the methodological design and provides justification for the use of such a quantitative design with the addition of supplementary interviews.

4.3.1 Quantitative design

Ontological objectivism and epistemological positivism assumptions tend to support the use of quantitative methodology. Quantitative research is closely associated with the positivist paradigm (Saunders et al., 2016), and this method is widely used in costing systems research, and, more specifically, in ABC adoption studies (e.g. Aljabr, 2020; Bjørnenak, 1997; Brierley, 2011; Brown et al., 2004; Cagwin and Bouwman, 2002; Clarke and Mullins, 2001; Cohen et al., 2005; Elhamma and Fei, 2013; Hadid, 2019; Innes and Mitchell, 1995; Ittner, 1994; Jusoh and Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998; Malmi, 1999; Schoute, 2004; Van Nguyen and Brooks, 1997), AM usage studies (e.g. Askarany et al., 2010; Baird, 2007; Baird et al., 2004; Gosselin, 1997), and CSS studies (e.g. Al-Omiri and Drury, 2007; Brierley, 2008b; Ismail and Mahmoud, 2012; Schoute, 2009). This method makes use of statistical tests to ascertain whether an observed relationship between the variables is reliable, and the use of this method in this thesis requires a full definition of the measurement of the variables of interest (Collis and Hussey, 2014). In this thesis, it was important for the researcher to examine specific attributes or variables, an aspect referred to as operational definition, which entails the measurement of a particular point, thereby restricting the analysis to only that which is relevant. A study of operationally defined variables further enhances the reliability of the survey, making the results more generalisable to large populations (Collis and Hussey, 2014).

A number of quantitative data methods are available, including the cross-sectional survey method deemed most suited to answering the research questions posed in this specific study. A survey questionnaire is subject to analysis to determine any emerging interconnecting trends or relationships (Bryman and Bell, 2015), and Saunders et al. (2016) identified that this approach is an efficient and cost-effective way in which to gather a sizable data set. Bryman and Bell (2015) also highlighted that the use of a survey questionnaire lends itself to inviting a large number of companies to engage in research, thus ensuring that sample results can be generalised to a wider population base. In addition, the requirement for subjects to respond only on a one-time basis has been identified by both Collis and Hussey (2014) and Saunders et al. (2016) as being more conducive to maintaining or improving the expected response rate.

4.3.2 Qualitative design

Unlike quantitative design, which focuses on numbers and measurements, qualitative design uses descriptions of the type and quality of the subject under investigation, giving the researcher a duty to interpret these observations to understand events. According to Saunders et al. (2016), a qualitative research study aims to provide an individual reading the study with a mental picture of the observations made by the researcher. The nature of qualitative studies does not enable the researcher to use numerical values in analysis, however, and they generally focus on a few individuals as representative sample of an entire study population. Researchers' personal views and descriptions are the basis of qualitative research, which makes it likely that some level of bias or subjectivity exists in all described research phenomenon. Such description of the observations also generally takes the form of a dynamic, personal account of the occurrence (Creswell, 2014), creating not a tallying of occurrences but an individual or a group's own story.

4.3.3 Rationale for a quantitative design with supplementary interviews

The current research adopts a quantitative design with some supplementary interviews. A survey questionnaire was the primary data collection method applied to achieve the two research objectives and to answer the nine research questions ($RQ_{1/1}$ - $RQ_{1/5}$, and $RQ_{2/1}$ – $RQ_{2/4}$) (see section 1.3), with this used to the collect quantitative data used test the research hypotheses on the ABC adoption model, AM usage model, and CSS model. The survey questionnaire was deemed an appropriate choice for the current research due to the existence of previous studies developing theory and mechanisms for specifying the contingent factors that can impact costing systems, and also costing systems' effect on non-financial performance factors and financial performance. The literature discussed earlier in chapters 2 and 3 thus provided contextual information, both conceptual and empirical, which was employed to produce and validate a research model and hypotheses.

Dependence on a single data collection method does not, however, offer an adequately in-depth understanding of the influence of contingent factors on costing systems and the impact of the costing systems on performance. Research that relies on a single data collection method, even in terms of the collection of quantitative data, may be inadequate in terms of providing an in-depth understanding of the impact of contingent factors and outcomes of costing systems, and cause such research to reach a dead end. Consequently, the current research adopted supplementary interviews to answer six qualitative research questions ($RQ_{1/6}$ - $RQ_{1/8}$, and $RQ_{2/5}$ – $RQ_{2/7}$) (see section 1.3) to provide supplementary evidence to help the researcher to better understand any contradictory findings, as well as to confirm supported hypotheses and to suggest other variables that may arise, including those that may not have been addressed in the current study.

The current research methodology (the quantitative design with some supplementary interviews) differs from a formal mixed method design for two reasons. The number of interviewees is lower than the standard number for qualitative design or mixed method approaches, which generally require more than six interviewees (Creswell, 2014) and, unlike in a mixed method approach, the interview responses will not provide sufficient data to enable revisions to the research model.

The current research thus uses the interview data to support discussion of the overall results, and to generate ideas for tentative modifications of some of the relationships tested within the models. Given the limited supplementary evidence, these are mainly used in the discussion of future research opportunities in the conclusion (chapter 9), and rather than taking the form of definitive revisions to models for future testing. In addition, the use of supplementary interviews increased consideration of the need for further qualitative research into issues raised in these interviews that could improve the development of the theoretical explanations for the possible relationships observed. As these have been identified as necessary by the interview participants, examining these potential variables could lead to the identification of factors influencing ABC adoption, AM usage, and CSS not previously identified in the development of the quantitative model, which may not have been part of previous costings systems research and which may thus have the potential to deliver improvements to the research model in future quantitative research. Ethical approval was granted to undertake this research and further details are in section 4.5.

4.4 Data collection methods

The following sub-sections thus discuss the survey questionnaire method and how it was used and operationalised in this research; one additional sub-section is then devoted to the process development and implementation of the interview method.

4.4.1 The survey questionnaire method

A survey questionnaire is "a method for collecting primary data in which a sample of respondents are asked a list of carefully structured questions chosen after considerable testing, with a view to electing reliable responses" (Collis and Hussey, 2014, p. 205). Questionnaires are frequently used to collect quantitative data in business research and there is no single route by which questionnaires must be issued to participants (Collis and Hussey, 2014). Collis and Hussey (2014) describe questionnaires as being structured lists of questions, selected for extensive testing, which aim to gather accurate responses from a selection of people. Common forms include postal and online questionnaires (Collis and Hussey, 2014).

This research method was selected as it permits access to a large quantity of companies, the names and addresses of which were selected from the Financial Analysis Made Easy (FAME) database. The survey questionnaire method has been used extensively in management accounting research (Van der Stede et al., 2005) because it is cost-effective regarding time as well as resources, while also ensuring convenience for the participants who are able to determine when they would like to complete the questionnaire (Bryman and Bell, 2015; Collis and Hussey, 2014).

Prospective participants were contacted by post or email and informed of the current research's goals and objectives. Participants were also asked whether they preferred a mailed or online questionnaire. Mail questionnaires have been more extensively used than online questionnaires due to the relatively recent introduction of the latter, and examples of mail questionnaires being utilised in ABC adoption literature include Aljabr (2020), Brierley (2011), Brown et al. (2004), Cohen et al. (2005), Hadid (2019), Jusoh and Miryazdi (2015), Schoute (2004), and Yazdifar et al. (2019). Other examples in AM usage literature include Askarany et al. (2010) and Baird et al. (2004), while in CSS literature, Al-Omiri and Drury (2007), Brierley (2008b), and Schoute (2009) used such instruments. Few studies in the field thus far have utilised online questionnaires in ABC adoption, with the exception of Cohen et al. (2005).

Mail questionnaires were thus chosen for the bulk of the current research due to these offering respondents greater privacy and a longer time to complete them (Collis and Hussey, 2014). However, an online questionnaire format was used as a supplement to this,[29] as online questionnaires offer some advantages over postal forms in terms of cost savings and a more rapid distribution process (Saunders et al., 2016). Additionally, response rates and times may be increased by the simplicity of distributing the online questionnaires and the ease with which

[29] SmartSurvey was used in the current research for the online questionnaire (https://www.smartsurvey.co.uk)

answers can be returned (Saunders et al., 2016). The online and paper questionnaires had exactly the same design format, and the covering letter for the paper version explained that participants could choose to complete the online version if they preferred by requesting the online version from the researcher.

The following sub-sections discuss, in order, the questionnaire design, format and layout; the piloting of the questionnaire; the covering letters; the research population and sampling; the design of the final questionnaire and variable measurements; the selected research participants and business units; questionnaire administration; the response rate; non-response bias; and the initial data analysis.

4.4.1.1 Questionnaire design, format and layout

In order to achieve a satisfactory response rate with valid and reliable data, a survey questionnaire must be both well-designed and well-developed (Dillman et al., 2014). This research therefore followed the recommendations of Dillman et al. (2014) and Saunders et al. (2016) to increase the response rate, data validity, and reliability. Following these recommendations meant that:

1. The questionnaire used a form that was as short as possible, with eight pages in total. Using eight pages or fewer in a questionnaire can increase the response rate and improve the quality of responses. The current research was not possible with a questionnaire with fewer than eight pages, as this would omit questions necessary for testing the comprehensive model.
2. The questionnaire was printed on both sides of A3 sized pages made up into a booklet.
3. The front page of the questionnaire included (a) the research title, (b) the research description and objectives, and (c) the Sheffield University Management School address for return of the postal version.

4. The back page of the questionnaire included (a) an open-ended question allowing participant comments on the questionnaire topic, (b) a yes or no question facilitating a request for a copy of the research results, (c) a yes or no question facilitating a request for an interview with the researcher, and (d) an optional question seeking the participant's contact information for a follow-up interview (name, telephone number and e-mail address).
5. The questionnaire used an attractive layout and included easy-to-understand tables.
6. The questionnaire provided participants with clear definitions of variables to ensure that they understood these variables.
7. Most of the research questions were closed-ended questions, with a five-point Likert scale used to measure eight variables: (a) AM usage, (b) competition, (c) business strategy, (d) service diversity, (e) service quality, (f) service cycle time reduction, (g) cost reduction, and (h) financial performance. Such Likert scale questions save space and are easier for participants to read.

8. The 22 questions were divided into three sections, with similar questions categorised within a section to encourage participants to answer the relevant questions. The first section of the questionnaire consisted of seven questions focusing on ABC adoption, AM usage, and CSS, while the second and third sections involved seven and eight questions respectively and focused on contingent factors and firm characteristics.
9. The first question in the questionnaire was a multiple choice question, which is the easiest type of question in terms of the required time to answer (Dillman et al., 2014). This question measured the experience of ABC adoption in UK non-manufacturing companies and offered nine options.

10. The questions that required more specific data about the company, such as cost structure, sales revenue, capital employed, and number of employees, was withheld to the last section.
11. The first page was a cover letter, without any questions, while all of the questions on subsequent pages were designed to fit on single pages.
12. Each posted questionnaire had a printed code (from A1 to A2,000 for the questionnaires sent before the first reminder, B1 to B2,000 for the questionnaires sent after the first reminder, and C1 to C2,000 for the questionnaires sent after the second reminder) that appeared on the top right corner of the questionnaire to aid the researcher in determining who had returned the questionnaires and which were received prior to the first reminder, after the first reminder, or after the second reminder. This information enabled the application of the non-response bias test (sub-section 4.4.1.9).

4.4.1.2 Pilot questionnaire

In order to achieve accurate data, Dillman et al. (2014) advised that pre-testing a questionnaire is an important step before beginning data collection. This research thus asked practitioners and academics to test the questionnaire prior to launch. With regard to the selection of practitioners, the FAME database was used to select 20 non-manufacturing companies located in South Yorkshire. The pilot questionnaire consisted of eight pages, with 21 questions over three sections, and the process had four distinct stages:

1. On 4 June 2018, an advance letter was posted to inform participants about the aims of the research, the objectives of the pilot questionnaire, and when the pilot questionnaire would be sent out.
2. On 18 June 2018, the pilot questionnaire, a covering letter, a participant information sheet, a consent form, and a prepaid envelope were posted to the chosen companies.

3. On 2 July 2018, a first follow-up was posted to the chosen companies, including the pilot questionnaire, a covering letter, a participant information sheet, a consent form and a prepaid envelope.
4. On 16 July 2018, a second follow-up was posted to the companies, again including the pilot questionnaire, a covering letter, a participant information sheet, a consent form and a prepaid envelope (see Appendix 2, which contains the pilot questionnaire [Appendix 2.1], consent form [Appendix 2.2], participant information sheet [Appendix 2.3], and cover letters [Appendices 2.4 - 2.7]).

The response rate for the pilot questionnaire among practitioners was 10% (2 responses), and based on the comments received, some modifications to the wording of questions were applied. With regard to academic piloting, the researcher contacted three academics with expertise in management accounting who offered some feedback on the pilot questionnaire; they suggested re-wording some questions, specifically the question relating to the adoption time of ABC (question A_2) and service cycle time reduction (question B_4). The questionnaire was thus reworded based on their suggestions.

4.4.1.3 Covering letters

The covering letter that accompanied the survey questionnaire included important information for research participants (Dillman et al., 2014), such as details about the research aims and the importance of participation. The official letterhead provided by the Sheffield University Management School was used for these letters, each of which was printed on a single A4 page. The covering letter for this research included the following information:

1. The companies' address, and the name of the participants or their position (i.e. financial director).
2. The importance of participation.

3. The research objectives.
4. The database through which participants were identified and selected.
5. The fact that the participant information, including their responses, would remain confidential.
6. An explanation of the printed code (from A1 to A2,000, B1 to B2,000, or C1 to C2,000 depending on the batch) on the top right corner of the covering letter to help the researcher during the preparation of questionnaire envelopes.
7. The name and contact details of the researcher to allow participants to ask questions or seek clarification about the research, or to request the online version of the questionnaire.
8. The researcher's signature.

4.4.1.4 Research population and sampling

A research population is defined as a collection of individuals or objects with some shared characteristics. The terms individual and object may refer to people, companies, or locations in this case (Bryman and Bell, 2015). The research population for this study was UK non-manufacturing companies classified as medium and large in size. These companies were thus expected to have ≥ 50 employees and ≥ £25 million sales revenue. [30] The reason for restricting the population to only medium and large non-manufacturing companies is that small companies are less likely to have sufficient resources to invest in updated costing systems such as ABC and CSS (Abdel-Kader and Luther, 2008; Al-Omiri and Drury, 2007).

[30] Numerous studies on costing systems implemented the criterion of 50 employees for distinguishing between small-, medium-, and large-sized companies (Baird et al., 2004; Schoute, 2009; Tuanmat and Smith, 2011). Thus, a medium size firm is defined as one with at least 50 employees. In addition, a medium size firm is defined as one with at least £25 million sales revenue (GOV.UK, 2012).

The FAME database, available on the University of Sheffield website was used; this provides information about British and Irish companies, such as type of industry, type of sector, number of employees, financial information, and company address. The FAME database provides a company's financial information for the last decade, as well as detailing its financial strength and providing stock market data (when applicable) and information about shareholders and subsidiaries. FAME has been used in prior management accounting research (Abdel-Kader and Luther, 2008; Al-Omiri and Drury, 2007; Banhmeid, 2017). A sample of 2,969 UK non-manufacturing companies was identified and extracted from the FAME database. Records satisfying the criteria for selection are shown in Table 4.1.

Table 4.1: Research population criteria

Criteria	Number of companies
1. UK companies with an active status	4,624,321
2. Private companies[a]	4,109,883
3. Companies with independence indicators A, B, C, and D only[b]	3,974,618
4. UK companies located in England, Scotland and Wales	3,744,162
5. Companies with a minimum of 50 employees	35,480
6. Companies with a minimum of £25 million sales revenue	17,592
7. Companies in the service sector[c]	11,524
8. After exporting the data from FAME database to an Excel sheet; five adjustments had been made: a. No companies whose main activity included reference to "manufacturing" and/or "manufacture". b. No companies whose main activity included reference to "producing" and/or "product". c. Removing the 20 pilot companies. d. Removing duplication on company name, telephone, email and website. e. Removing companies that do not have telephone number and e-mail.	2,969

[a] The current research opted to investigate private companies as opposed to public companies. For the purpose of clarification: A public organisation is one which the public has partial or whole ownership, by way of an initial public offering, while a private organisation is owned either by its original founders and management or by a private investment group (Boyne, 2002).

[b] These indicators represent different ownership percentages. Each character has a different definition, particularly in terms of group A and groups B, C and D (Cucculelli, 2008). "Indicator A is attached to any company with known recorded shareholders, none of which having more than 25%; indicator B is attached to any company with a known recorded shareholder, none of which with an ownership percentage (direct, total or calculated total) over 50%; indicator C is attached to any company with a recorded shareholder with a total or a calculated total ownership over 50%; and indicator D is allocated to any company with a recorded shareholder with a direct ownership of over 50%" (Cucculelli, 2008, p. 174). This research population included indicators A, B, C, and D to increase the sample as when A was excluded, the sample was less than 2,000 companies.

[c] According to Jones (2013), the UK standard industrial classification (SIC) service industry is divided into 14 sections or sectors. "These sections are G (wholesale and retail trade; repair of motor vehicles and motorcycle), H (transportation and storage), I (accommodation and food service activities), J (information and communication), K (financial and insurance activities), L (real estate activities), M (professional, scientific and technical activities), N (administrative and support service activities), O (public administration and defence; compulsory social security), P (education) , Q (human health and social work activities), R (art, entertainment and recreation), S (other service activities) and T (activities of household employers)" (Jones, 2013, p. 3) . This research used 13 sections, excluding section K, as companies which work in financial and insurance activities are generally large and less likely to have responded to the survey.

The average response rate in previous UK research on ABC adoption and CSS using the FAME database has been around 20% (19.6% for Abdel-Kader and Luther (2008) and Al-Omiri and Drury (2007), and 20.5% for Banhmeid (2017). The target for this research was approximately 400 usable responses, a large sample selected to increase statistical power (Hair et al., 2019); this large sample size was also needed to investigate the current complex research model, and for structural equation modelling (SEM) analysis purposes. This meant that 2,000 questionnaires were randomly distributed to selected UK non-manufacturing companies.

4.4.1.5 Final questionnaire and variable measurements

The final version of the survey questionnaire contained three sections with 22 questions overall. Section A consisted of seven questions, with sections B and C containing seven and eight questions, respectively.

Section A: contained seven questions that aimed to obtain information about the costing systems used in the business units. In particular, it aimed to measure ABC adoption, AM usage, and CSS, and thus also contained definitions of terminology such as ABC, cost pools (cost centres), overhead allocation rates (cost drivers), volume overhead allocation rate (volume cost drivers), and non-volume overhead allocation rate (non-volume cost drivers) to help the participants to understand the meaning of each variable.

Question 1 (A_1) measured the business unit experience with ABC using a multiple-choice format, with one choice permitted from nine options. This measurement of the experience of ABC was taken from Brierley (2011), with the measure of ABC adoption developed by collapsing the ABC experience measure into four methods of ABC adoption. The measures of ABC adoption were then categorised in four possible ways (as discussed in chapter 2, subsection 2.2.1.1), with the first three methods adapted from Brierley (2011), and the fourth method of measuring ABC adoption defined as companies who have currently adopted ABC (option 1 of question A_1). Non-adoption was thus defined for companies that have not adopted ABC, that is, those who chose any option from 2 to 9 (Clarke and Mullins, 2001; Cohen et al., 2005; Elhamma and Fei, 2013; Ittner et al., 2002; Khalid, 2005). The current research used ABC adoption construct four due to the fact that including only the fourth measure of ABC allowed the results for the three models in this research to be based on the same sample size, removing difference in the samples between models. In addition, this maximised the sample size, which made it more likely for SEM to be used. Question 2 (A_2) measured the time since adoption of ABC. This was a self-developed open-ended question.

Question 3 (A_3) was adapted from Baird (2007), Baird et al. (2004), and Gosselin (1997) in an attempt to measure AM usage (including AA, ACA, and ABC usage). The current research made three modifications to the measurements of Baird (2007) and Baird et al. (2004) for AM. The first modification was with regard to the scale used; in order to make the question consistent with the other measures in the current research, a five-point Likert scale rather than a seven-point Likert scale as employed by Baird (2007) and Baird et al. (2004), was used. In addition, the current research added more precise terminology for each of the points on the scale to ensure that each point was clearly distinguished from the others (1= not at all, 2= small extent, 3= medium extent, 4=large extent, and 5= very large extent), while the respondents in Baird (2007) and Baird et al. (2004) were given only two anchors (1= non-adoption and 7= adopt to a great extent), as the latter approach was judged to be potentially misleading due to the lack of definitions for points 2 to point 6.

The second modification was in the wording of AA usage definition. The current research defines AA as where a "business unit identifies and analyses the various activities involved in providing services, but without recording their associated costs". In contrast, Baird (2007) and Baird et al. (2004) used a statement without the second part, "but without recording their associated costs". Adding this clarification was done to make it easier for participants to understand that AA usage is not related to costs.

A third modification was made with regard to the wording defining ACA usage. The current research defines ACA as where a "business unit identifies, analyses, and records the costs of the various activities involved with providing services, but does not then use this cost information to calculate the cost of each service provided". Again, Baird (2007) and Baird et al. (2004) used a statement without the second part, "but does not then use this cost information to calculate the cost of each service provided". By adding the clarification, the current research made it easier for participants to understand that ACA usage is also not related to costs.

Question 4 (A_4) aimed to identify the purpose of using costing systems in participants' business units. This question was a multiple choice question, adopted from Drury (2018), with one or more than one choice permitted from four options.

Following the approach of Drury and Tayles (2005), open-ended questions to measure CSS were devised and included as Question 5 (A_5), measuring the number of cost pools (cost centres) and Question 6 (A_6), measuring the overhead allocation rates (cost drivers). Question 7 (A_7) was a self-developed open-ended question designed to measure the number of volume overhead allocation rates (volume cost drivers) and non-volume overhead allocation rates (non-volume cost drivers).

Section B: contained seven questions intended to obtain information about the respondent's business unit and its environment. It thus aimed to measure competition level, business strategy, service diversity, service cycle time reduction, service quality, cost reduction and financial performance.

Question 1 (B_1) measured the competition level of the business unit over four different items. Item ***a*** was adopted from Drury and Tayles (2005) and Schoute (2009) to measure the intensity of competition for major services provided by the business unit. Items ***b***, ***c***, and ***d*** were designed to measure the competition level, being adopted from Porter (1979), and thus considered the influence of supplier power, customer power, and threat from substitutes, respectively. The participants were asked to rate competition levels on five-point Likert scales ranging from 1 (not at all) to 5 (very high level).

Question 2 (B_2) measured the business strategy used by the business units. This question included six items, the first three of which measured the differentiation strategy (items ***a***, ***b*** and ***c***), and the last three of which measured the cost leadership strategy (items ***d***, ***e***, and ***f***). These items were adopted from Frey and Gordon (1999). Participants were asked to rate the business strategy on a five-point Likert scale, ranging from 1 (not at all) to 5 (very high extent).

The measurement of service diversity differed from the measurement of product diversity. Prior research has used measurements of product diversity and then applied these to both manufacturing and non-manufacturing industries.[31] However, this may have led to inconsistent results in term of the relationship between product diversity and costing systems. The current research thus focused only on the level of service diversity in non-manufacturing industry and each item captured the diversity level of services provided by the business units, as included in Question 3 (B_3). This question consisted of four items on five-point Likert scales, ranging from 1 (not at all) to 5 (very high level). Items ***a*** and ***b*** were adopted from Baird (2007) and Brown et al. (2004), with a focus on diversity in the provision of design and services, respectively. Of the two further items, ***c*** (diversity in the volume of services provided across different services) was adopted from ElMaraghy et al. (2013), and ***d*** (the diversity in the volume of services provided across different services segments) was adopted from Geringer et al. (2000).

Question 4 (B_4) measured the level of reduction in service cycle time on a five-point Likert scale ranging from 1 (not at all) to 5 (very high level); it consisted of four items. The first three items (***a***, ***b*** and ***c***) were self-developed questions designed to measure the influence of work

[31] More information about these studies are presented in chapter 3, sub-section 3.7.2.

methods on reducing the time associated with value-added (item ***a***) and non-value-added activities (item ***b***). Item ***c*** measured the influence of new technology on reducing the time associated with valued added activities, while the final item (***d***) was adopted from Campell (1995) to measure the influence of new technology on reducing the time associated with non-value added activities.

Addressing level of service quality, Question 5 (B_5) consisted of eight items on a five-point Likert scale, ranging from 1 (not at all) to 5 (very high level). These eight items captured the six determinants of service quality according to Parasuraman et al (1985) which are (1) competence (item ***a***), (2) reliability (item ***b***), (3) understanding and knowing the customer (item ***c***), (4) access (items ***d***, ***e***, and ***f***), (5) communication (item ***g***), and (6) responsiveness (item ***h***). Following this, Question 6 (B_6) measured the business unit's experience in terms of the reduction of service costs. This question consisted of two self-developed items based on five-point Likert scales ranging from 1 (no reduction) to 5 (very high reduction), measuring the reduction level of direct and indirect service costs.

The measurement of financial performance was addressed in Question 7 (B_7), which included three items to measure improvements relating to financial performance. These items were rated on five-point Likert scales ranging from 1 (no improvement) to 5 (very high improvement). Items ***a*** and ***b*** represented the improvement of net sales and return on investment (ROI), respectively, as adapted from Cagwin and Bouwman (2002) and Jänkälä and Silvola (2012). Item ***c*** measured the improvement of return on assets (ROA), as adapted from Maiga and Jacobs (2007).

Section C: contained eight questions aiming to obtain information about the respondents' demographic and company characteristics. The first, Question C_1, measured the cost structure in the business unit, featuring three self-developed items requiring the percentages of (1) direct costs directly traceable to services, adopted from Drury and Tayles (2005); (2) indirect service-based costs not directly traceable to services, also adopted from Drury and Tayles (2005); and (3) non-service-based costs not directly traceable to services. The size of business unit was measured by three items (C_{2a}, C_{2b}, and C_{2c}), which were open-ended questions. Question C_{2a} and C_{2b} asked participants to offer an approximate number of employees and annual sales revenue for their business units, as adopted from Brierley (2011). Item C_{2c} was a self-developed question that asked the participants to offer an approximate amount of capital employed (net assets).

The final part of section C included (1) an open-ended question seeking a description of the service sector of the business unit; (2) an open-ended question seeking the participant's views on the costing systems of services in their business unit; (3) an offer for the participant to receive a summary of the research results; and (4) an interview request (a copy of the final questionnaire is shown in Appendix 3.1, a letter sent to respondents who requested a copy of the questionnaire results is shown in Appendix 3.2, summary of questionnaire results sent to respondents who requested a copy of the results is shown in Appendix 3.3).[32]

4.4.1.6 Research participants and business units

According to Dillman et al. (2014), a research questionnaire should be posted to the most knowledgeable person with the experience to answer the relevant research questions. Management accountants or financial directors were therefore judged to be in the best position to complete this questionnaire. These participants have also been used in previous studies regarding cost and management accounting as they can provide relevant information about the

[32] The summary of the questionnaire results was sent by email to the participants on 11th January 2021. But some of the participants did not write their email in the questionnaire, so the summary of the questionnaire results with the draft letter were send by post.

cost accounting systems and practices (e.g. Abdel-Kader and Luther, 2008; Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005; Kallunki and Silvola, 2008). Covering letters were posted to the prospective reconsents of the selected firms along with instructions, in the form of participant information sheets, that the questionnaire should be completed by a member of the management accounting function. However, the FAME database does not provide the names of the financial directors or management accountants that the study aimed to contact, so the researcher contacted the 2,000 selected companies by email, using addresses gathered from FAME, the companies own websites, or LinkedIn, in order to ascertain the correct person to address questionnaires to in each case. Based on this, 595 of the 2,000 covering letters and questionnaires included the name of a participant as provided by the company; the remaining 1,405 covering letters and questionnaires were posted to "the financial director".[33]

In relation to business units, large companies may have different business units; the head offices of divisional companies, the divisions of divisional companies, non-divisional companies, or autonomous companies will each have different costing systems and different levels of diversity (Al-Omiri and Drury, 2007; Drury and Tayles, 2005). As large organisations may be comprised of several diverse business units or divisions, with each division having a different costing system and range of contingent factors (e.g. high/low product diversity) (Al-Omiri and Drury, 2007; Drury and Tayles, 2005), the covering letter therefore contained this statement: "you should answer the questionnaire from the perspective of the business unit that most clearly defines where you work".

4.4.1.7 Questionnaire administration

The final questionnaire was distributed to 2,000 UK non-manufacturing companies in three

[33] Of these, 40 names came from contacting companies by email, and 555 names came from LinkedIn.

stages without the use of an introduction letter as used in the pilot; this was done as posting 2,000 additional letters in the UK would have been too costly. This use of staging is discussed further below.

1. On 24 September 2018, printed questionnaires were posted by mail with covering letters, consent forms, participant information sheets, and a prepaid envelope.
2. On 15 October 2018, the first reminder for the questionnaire was posted to those companies who had not responded by 24 September. This also included covering letters, consent forms, participant information sheets, and prepaid envelopes.
3. On 5 November 2018, second reminders for these questionnaires were posted to those companies who were noted as non-respondent on both 24 September and 15 October. Again, this included cover letters, consent forms, participant information sheets, and prepaid envelopes, (see Appendix 3 which contains: the final questionnaire [Appendix 3.1], consent form [Appendix 3.4], participant information sheet [Appendix 3.5], and cover letters [Appendices 3.6-3.8]).

Seventy-eight out of 2,000 companies requested an online questionnaire. The link to the online questionnaire was sent to these participants' email, along with the participant information sheet and consent form.

4.4.1.8 Response rate

To improve the response rate, two post-questionnaire reminders and telephone calls were made to non-respondents to encourage them to participate in the research questionnaire. Overall, 263 completed questionnaires were received in the post (n = 212) and online (n = 51), yielding a 13.15% total response rate. Of these responses, 44 questionnaires were not usable for various reasons, as illustrated in Table 4.2. The final sample of usable responses was thus 219 questionnaires, giving a 10.95% effective response rate. The response rate for this research thus was lower than that of other UK studies into ABC and CSS that have used the FAME database (19.6% (Abdel-Kader and Luther, 2008; Al-Omiri and Drury, 2007) and 20.5% (Banhmeid, 2017)), and lower than that of other UK studies into costing systems that did not use the FAME database (11% (Al-Sayed and Dugdale, 2016) and 41.6% (Brierley, 2007)). Overall, 73 companies explicitly refused to complete the questionnaire with no reason given, while 87 companies refused to complete the questionnaire for the reasons shown in Table 4.3.

Table 4.2: Information about questionnaire responses

	N	Total
Not usable questionnaires		
1. Respondents were not conducting activities related to the current research SIC classifications.[a]	16	
2. Questionnaire had inconsistent answers for the number of cost pools and drivers.[b]	19	
3. Questionnaires had missing values ≥ 10% of the total responses in the questionnaire.	8	
4. Questionnaires had missing values for one variable, e.g. 'cost structure'.	1	
		44
Usable questionnaires[c]		
1. Questionnaire received before the first reminder.[d]	38	
2. Questionnaire received after the first reminder.[e]	89	
3. Questionnaire revived after the second reminder.[f]	92	
		219
Total		263

[a] The current research excluded some SIC classifications because they do not represent service companies. (1) In SIC classification C "Manufacturing", this research excluded one company under SIC 33 code "Repair and installation of machinery and equipment", and one company is under SIC 18 code "Printing and reproduction of recorded media". (2) In SIC classification D "Electricity, Gas, Steam and Air Conditioning Supply", the current research excluded one company under SIC 35 code "Electricity, gas, steam and air conditioning supply". (3) Under SIC classification F "Construction", the current research excluded eight questionnaires under SIC 41 code "Construction of buildings", four companies under SIC 43 code "Specialised construction activities", and one company under SIC 42 code "Civil engineering". (4) Under SIC classification K "Financial and Insurance Activities", the current research excluded two companies under SIC 66 code "Activities auxiliary to financial services and insurance activities".
[b] Inconsistent answers included cases where the number of cost drivers was higher than the number of cost pools or the total volume and non-volume cost drivers were not equal to the number of cost drivers.
[c] The total number of usable questionnaires was 219. However, only 204 were included in the analysis as 15 respondents only answered section C, as the companies in question did not have costing systems.
[d] This included 29 posted questionnaires and 9 online questionnaires.
[e] This included 62 posted questionnaires and 27 online questionnaires.
[f] This included 81 posted questionnaires and 11 online questionnaires.

Table 4.3: List of reasons for not participating in the questionnaire

	N
The questionnaire is irrelevant to the companies	23
Company policy	20
Limited time and resources	20
Manufacturing companies	11
Do not have costing systems	7
Too busy	2
The required person to answer the questionnaire was not found	2
The company does not exist	1
Confidentiality reasons	1
Total	87

4.4.1.9 Non-response bias

This research used a survey questionnaire to collect quantitative data, making analysis of non-response bias an important method to ensure that the participants were not different from those in the relevant population who did not take part in the research (Collis and Hussey, 2014). As not all financial directors or management accountants responded to the survey questionnaire, if the non-responding companies are different from those of the people who did respond, the research results cannot be generalised to the population from which the research sample was selected (Bryman and Bell, 2015).

The wave method is a method of non-response bias analysis widely used in management accounting research (Abdel-Kader and Luther, 2008; Al-Omiri and Drury, 2007; Brierley, 2007; Drury and Tayles, 2005), and is conducted based on the premise that late respondents can be assumed to be similar to non-respondents. This method compares the answers of early respondents to those of late respondents. If statistical differences are detected, this indicates a significant difference between early and late respondents. This research used the wave method for identifying any non-response bias in the raw data, with three scenarios were created for this test, relating to early, middle, and late respondents. The first scenario compared questionnaires received prior to the first reminder ($n = 38$) with questionnaires received after the second reminder (n = 92).[34] The second scenario compared questionnaires received prior to the first reminder (n = 38) with questionnaires received after both the first and second reminders (n = 89+92). The third scenario then compared questionnaires received prior to and after the first reminder (n = 38+89) with questionnaires received after the second reminder (n = 92).[35]

Various tests were applied to test for non-response bias using these three scenarios. A chi-square test was performed on the nominal variable (ABC adoption and the use of costing systems), which revealed no significant differences between the questionnaires received prior to the first reminder and the questionnaires received after the first and second reminders (second scenario) in terms of ABC adoption ($p = 0.90$), and the use of costing systems ($p = 0.753$) (see Appendix 4.1 and Appendix 4.2), which explain the statistical results of the non-response bias test for ABC adoption and the use of costing systems, respectively. An independent sample T test and the Mann-Whitney test were also used to examine whether any differences existed between any interval scaled variables for the three scenarios (see Appendix 4.3). The results suggested that no significant differences existed between questionnaires received prior to the first reminder and questionnaires received after the first and second reminders (second scenario) based on the Mann-Whitney test, except for AA usage ($p = 0.02$), cost reduction ($p = 0.01$), cost structure ($p = 0.01$), and sales revenue ($p = 0.01$). It is difficult to explain these differences, yet given the small number of significant differences related to the total number of tests, it is reasonable to assume overall that non-response bias is probably not an issue, based on the assumption that late respondents are similar to non-respondents.

[34] For the 15 companies without costing systems, response bias tests were run for section C (cost structure, number of employees, sales revenue and capital employed). Six of these were received prior to the first reminder, seven after the first reminder and two after the second reminder.

[35] The second scenario was selected because it produced the clearest responses, with lower variables that included p values ≤ 0.05.

4.4.1.10 Overview of questionnaire data analysis: structural equation modelling

SEM is an important multivariate statistics analysis technique often used in social science to develop and test complex theories (Hair et al., 2019), yet the label SEM refers to the use of a combination of analysis types such as factor analysis with multiple regression rather than a particular statistical technique in and of itself (Hair et al, 2019). The analysis of covariance structures is the main role of SEM, and various different estimation techniques are available to estimate such parameters. Examples of these estimations technique include maximum likelihood estimation (MLE), weighted least squares, and generalised least squares (Hair et al, 2019). These estimation techniques vary in terms of their effectiveness and efficiency, based on the sample size and data distribution. However, MLE is the most widely used as it remains robust even where an assumption of normality is not met (Olsson et al., 2000; Savalei, 2008).

Some previous studies in this field have used bivariate analysis methods (e.g. Bjørnenak, 1997; Malmi, 1999), while others have used multivariate statistical analysis (e.g. Al-Omiri and Drury, 2007; Brierley, 2008b; Gosselin, 1997; Guilding et al., 2005; Ismail and Mahmoud, 2012; Krumwiede, 1998). As Hair et al. (2019) suggested, biased results may result from the use of multivariate methods, however, as these are unable to rectify any measurement errors in investigated factors. SEM differs from multivariate statistical analysis in several ways, including the fact that SEM can include latent variables in any analysis alongside directly observable variables.[36] These latent constructs, such as competition, service diversity, and service cycle time reduction, are then identified by multiple indicators that reflect and indirectly measure the latent variable (Hair et al., 2019). Based on this, latent constructs may display

[36] The terms latent variable, latent construct, and latent factor have been used interchangeably (Hair et al., 2019). In addition, the terms directly observed variable, manifest variable, measured variable, and indicator have also been used interchangeably (Hair et al., 2019).

measurement errors due to the number of necessary indicators and the variance of these within the latent variable (Hair et al., 2019); however, while multivariate statistical analysis cannot address and correct such measurement errors, potentially leading to bias in results (Hair et al., 2019), SEM can address errors in coefficient estimates of hypothesised relationships by correcting for measurement errors relative to the number of indicators in each latent construct (Hair et al., 2019). Consequently, SEM can simultaneously examine the measurement properties of indicators and the theoretical relationships between different types of variables, including directly observed variables and indirectly observed latent constructs (Henri, 2007).

SEM is also appropriate for testing complex models with multivariate data (Hair et al., 2019), being a particularly effective technique when the model contains variables that act as dependent variables in some relationships and as independent variables in others. This thesis focuses on five independent factors: ABC adoption, AA usage, ACA usage, ABC usage, and CSS; these variables may thus be both dependent and independent, depending on context. In addition, the non-financial performance variables of interest, service quality, service cycle time reduction, and cost reduction, can also play both roles in varying circumstances. Financial performance is always, however, a dependent variable. Thus, SEM was utilised by applying a three-in-one technique including multiple regression, factor analysis, and path analysis (Hair et al., 2019). The following sub-sections discuss the two key components of SEM, the measurement model and the structural model, along with further discussion about testing mediation relationships.

4.4.1.10.1 The measurement model

The measurement model is the first component in SEM, being concerned with the assessment of relationships between indicators or manifest variables and latent constructs (Hair et al., 2019). This process may be done by applying confirmatory factor analysis (CFA), which tests the relationships between research indicators and latent constructs and confirms these against the appropriate theory based on research hypotheses or prior empirical studies (Hair et al., 2019; Tabachnick and Fidell, 2019). "CFA is a way of testing how well a prespecified measurement theory composed of measured variables and factors fits reality as captured by data" (Hair et al., 2019, p. 660). In addition, CFA evaluates the validity, reliability, and dimensionality of the research variables or constructs (Hair et al., 2019).

CFA has two main steps. The first step requires the researcher to identify and specify the latent variable, the indicators of each latent construct, the error in each indicator, and, based on existing theories, the correlation between all latent constructs in the research (Hair et al., 2019). The second step, applied after the measurement model has been identified and specified, requires assessment of the measurement model's validity. Here, validity refers to whether the data collected fits the hypothesised model, while model fit compares the theory to reality, with the estimated covariance matrices (theory) being compared with the observed covariance matrix (data) (Hair et al., 2019). The theoretical model is said to fit the data well when the difference between the estimated covariance matrices and observed covariance matrix is small (Hair et al., 2019); when the difference between the estimated covariance matrices and observed covariance matrix is large, this indicates a weak or poorly fitted model, or that modifications based on theoretical and statistical results are required (Blunch, 2012; Hair et al., 2019).

Identifying how well the specified theoretical model represents reality as shown by the data is the main role of goodness-of-fit (GOF) testing. There are a number of goodness-of-fit indices that can be used to evaluate the degree of goodness of the overall fit of a specified theoretical model. These measures have been categorised into three groups: (1) absolute fit indices, (2) incremental fit indices, and (3) parsimonious fit indices (Blunch, 2012; Hair et al., 2019). The first group of absolute fit indices measure the degree to which the specified model fits or reproduces the data (Blunch, 2012; Hair et al., 2019). Absolute fit indices do not, however, compare the GOF of the specified model to that of any other model (Hair et al., 2019). The most widely used indices that belong the absolute fit are: (1) chi-square (χ^2), (2) normed chi-square (χ^2/degree of freedom), (3) root mean square error of approximation (RMSEA), (4) degree of freedom (*df*), and (5) standardised root mean residual (SRMR) (Hu and Bentler, 1998; Hair et al., 2019) .

The second group are the incremental fit indices, which measure the degree to which the specified model matches an alternative baseline model (Hair et al., 2019).[37] The most widely used indices in this group are the (1) comparative fit index (CFI), (2) incremental fit index (IFI), and (3) Tucker-Lewis index (TLI) or non-normed fit index (NNFI) (Hooper et al., 2008; Hu and Bentler, 1998; Hair et al., 2019).

The third group are the parsimonious fit indices, which provide information about which model among several competing options is best based on the fit of these models and their level of complexity (Hair et al., 2019). This measure aims to correct for any overfitting of the model and to evaluate the parsimony of the model in relation to the GOF. A parsimony-normed fit index (PNFI) was used in this research to evaluate this parsimonious fit. Hair et al. (2019) suggested adopting at least one absolute fit index and one incremental fit index, while the current research relies on more than one indicator for the first two groups, based on the five necessary models (ABC adoption, AA usage, ACA usage, ABC usage, and CSS), and the fitness indices are interchangeable between these. Thus, some fitness indices may be satisfied in one model and not in another model.[38] Relying on more than one indicator for each group has also been applied in other research (Cadez and Guilding, 2008; de Harlez and Malagueño, 2016; Fullerton et al., 2013; Jänkälä and Silvola, 2012; Lau, 2011; Maiga and Jacobs, 2007;

[37] "Baseline model is a null modal specifying that all measured variables are unrelated to each other" (Hair et al., 2019, p. 605).
[38] Further discussion of this is offered in chapters 5, 6, 7, and 8.

Pradhan et al., 2018; Uyar and Kuzey, 2016). Table 4.4 presents the fitness indices groups and the minimum acceptable level that reflects GOF.

Table 4.4: Type of fitness indices

Fitness indices	Example	Minimum acceptable level
1. Absolute fit indices	1. Chi-square χ^2	$p \geq 0.05$
	2. Normed Chi-square (χ^2/df)	≤ 3.0
	3. Root mean square error of approximation (RMSEA)	≤ 0.08
	4. Degree of freedom (df)	> 0
	5. Standardised Root Mean Residual (SRMR)	≤ 0.08
2. Incremental fit indices	1. Comparative fit index (CFI)	≥ 0.90
	2. Incremental fit index (IFI)	≥ 0.90
	3. Tucker–Lewis Index (TLI) or non-normed fit index (NNFI)	> 0.90
3. Parsimony fit indices	1. Parsimony normed fit index (PNFI)	≥ 0.50

Sources (Blunch, 2012; Hair et al., 2019; Hooper et al., 2008; Hu and Bentler, 1998; Kline, 2016)

4.4.1.10.2 The structural model

The measurement model is used for testing the indicator relationships' pattern along with the reliability, multicollinearity, and validity of the latent constructs of the research (Hair et al., 2019). In addition, the measurement model assumes that each latent construct is related to every other latent construct, as demonstrated by double-headed curved arrows in the measurement models (Hair et al., 2019),[39] which means that there is no difference between exogenous and endogenous constructs (Hair et al., 2019). Endogenous constructs refer to outcome, being constructs determined by other constructs, as illustrated by the single-headed arrows that point to them in the models (Hair et al., 2019), while exogenous constructs are considered to be determined by factors outside the research model and can be used to predict other constructs. Exogenous constructs do not have arrows pointing to them in the models due to this (Hair et al., 2019). A structural model aims to distinguish between endogenous constructs and exogenous constructs and aims to test model fit and the associated hypotheses (Hair et al.,

[39] An example of the double-headed curved arrows will be shown in the measurement models (see chapter 5, Figure 5.1).

2019). In addition, the structural model aims to test the research hypotheses, which include direct and indirect relationships. Testing the indirect relationship (mediation relationship) is thus discussed below.

4.4.1.10.3 Testing mediation relationships

This research also considered mediation relationships. Several different methods have been developed to test meditation hypotheses. These methods include (1) the Sobel test (Sobel, 1982), (2) the causal approach (Baron and Kenny, 1986), and (3) the bootstrapping method (Preacher and Hayes, 2004, 2008).

This research used the bootstrapping method to test the mediation hypotheses. As the most recent method to be developed, this takes advantage of advances in computing speed and power (Hayes, 2009; Preacher and Hayes, 2004). The bootstrapping method thus has several advantages and aims to avoid the limitations of previous mediation analysis methods. The method statistically tests and quantifies the indirect effects between independent (X) and dependent (Y) variables using the product of parameters *a* and *b*, as presented in Figure 4.1. However, Baron and Kenny's (1986) approach focuses first on the direct effect and whether or not it is significant, and does not then formally test the indirect effect. "[Baron and Kenny's] approach requires the researcher to estimate each of the paths in the model and then ascertain whether a variable functions as a mediator by seeing if certain statistical criteria are met" (Hayes, 2009, p. 410). This causal approach requires a significant effect from the independent variable (X) on the dependent variable (Y) in the absence of the mediator variable (M), which is called the total effect (direct + indirect effect). Relying on the total effect is not generally appropriate, however, because where there are multiple mediators with opposite signs, the total effect may be insignificant (Hayes, 2009; Preacher and Hayes, 2004). Combining the impact of several mediators with different signs may result in these mediators cancelling each other out (Hayes, 2018).

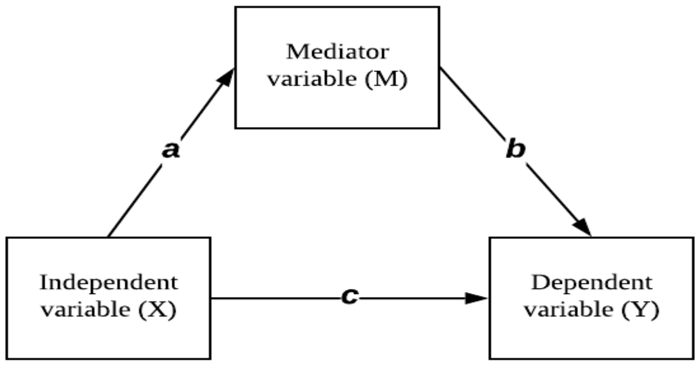


Figure 4.1: The mediation relationship

The second advantage of the bootstrapping method is its increased ability to detect the indirect impact of the mediator variables compared to the other methods (Hayes, 2009; Preacher and Hayes, 2004). For example, the Sobel test method can lead to inaccurate estimations of the indirect effect of *a* through *b* due to the method's low power. On the other hand, the bootstrapping method relies on the resampling technique and repeating samples from the same data to test the indirect effect of the mediator (Hayes, 2009). Consequently, this research uses the bootstrapping User-Defined Estimands method (syntax for analysis of moment structures (AMOS) to estimate mediation relationships, using 2,000 samples to estimate the mediation effect (User-defined estimands, 2010). The User-Defined Estimands method enables AMOS to estimate a specific indirect effect within a structural model using a Visual Basic or C# script. "Amos's user-defined estimand capability allows estimating multiple User-Defined Estimands and allows the estimands to be defined by a program of arbitrary complexity" (Arbuckle, 2013, p. 591). The next sub-section will discuss the interview method used in the current research.

4.4.2 The interview method

There is currently a movement in accounting research to use qualitative methods based on the increasing complexity of the environment and the importance of accounting's multiple roles in that environment (Moll et al., 2006). Qualitative methods such as interviews offer opportunities to access contextual information and provide information about how accounting relates to its environment (Moll et al., 2006). The interview method is widely used in qualitative research (Qu and Dumay, 2011), as it can be used in both interpretive and positivist research (Collis and Hussey, 2014).

An interview is a means to collect primary data in which interviewees are asked questions that enables the interviewer to discover what they feel, think, or do (Moser and Kalton, 2016). Interviews may follow various different procedures, being unstructured, semi-structured, or structured. The first two forms are mainly used for deeply questioning a phenomenon and developing theory, offering greater relevance to the inductive approach (Saunders et al., 2016). Semi-structured interviews require the questions in an interview to be planned in advance, and for each interviewee to have questions asked in the same sequence. However, some such questions may be open questions, allowing the respondent to reply in their own words, and space for further exploration of such answers must be provided (Collis and Hussey, 2014).

Based on this, some supplementary interview questions were selected for this research for several reasons:[40]

[40] Varying strategies used in qualitative research depend on the breadth and depth of the collected qualitative data. The most commonly used strategies are the (1) case study and (2) field study (Lillis and Mundy, 2005). There is a difference between these two strategies regarding both the depth of understanding of a phenomenon generated and the number of sites. A case study requires a deep understanding of a phenomenon based on massive qualitative data collection for a limited number of sites, while a field study requires multiple sites of investigation to be visited in less depth (Lillis and Mundy, 2005) .

1. To offer some explanation and interpretation of the results of the primary quantitative data in order to address the research questions;
2. To enhance the internal validity of the questionnaire results by obtaining interviewees' opinions on the significant and non-significant relationships identified, thus providing explanations for any unexpected relationships emerging between the variables;
3. To identify other potential variables that may influence ABC adoption, AM usage and CSS, potentially leading to recommendations for future qualitative research to improve the theory development; and
4. To identify possible ways in which ABC adoption, AM usage and CSS may influence other variables, which may lead to recommendations for future qualitative research to enhance the development of theory.

4.4.2.1 The interview guide

When conducting interviews, preparation of interview guidance is important to minimise any bias associated with the interviewees or interviewers (Lillis, 1999). This research was thus based on a pre-prepared interview guide composed of themes and questions relating to the research model and quantitative findings (attached in Appendix 5.1). The interview guide in this research thus contained five sections. The interview guide's first section was generated according to the quantitative data concerning the ABC adoption model. This section contained four parts. The aim of the first part was to explore the reasons and mechanisms behind the significant and non-significant effects of contingent factors on ABC adoption, while the second part explored the reasons and mechanisms behind the significant and non-significant effects of ABC adoption on financial and non-financial performance. The third part was designed to seek interviewees' perspectives on modifications to the left-hand section of the ABC adoption model, and to discuss possible factors that might influence this, while the fourth part of this section was designed to seek interviewees' perspectives on any modifications to the right-hand section of the ABC adoption model, along with possible performance factors that ABC adoption might influence.

The second section related to AA usage, the third to ACA usage, the fourth to ABC usage and the fifth section to CSS use; all of these sections followed a similar structure to the ABC adoption section, having four parts in each case.

4.4.2.2 Interview requirements

In order to arrange the interviews, the last page of the questionnaire had a section that requested participants to provide contact information (email and telephone number) if they were willing to be interviewed. Twelve respondents volunteered to be interviewed by the researcher. However, only three interviews actually occurred because their responses on the questionnaire were used in the quantitative data analysis. The remaining nine respondents were excluded as the research did not use their questionnaire responses in the quantitative data analysis.

The interviews were conducted face-to-face and took between 45 minutes and 101 minutes. Interview consent forms (see Appendix 5.2) and a participant information sheet (see Appendix 5.3) were distributed to all interviewees prior to any questions being asked. These face-to-face interviews were useful for gathering the required data for this study and clarifying points that might otherwise have remained unclear or may even have been omitted. The gap between receiving the questionnaires from participants and conducting the interviews was 12 months due to the time required for the process of quantitative data analysis. During that time, two letters were sent by mail to inform potential interviewees that the interviews would take place after the data analysis, and that this would be before the end of 2019. The first letter was sent on 4 February 2019 (see Appendix 5.4), and the second letter was sent on 10 September 2019 (see Appendix 5.5). On 24 October 2019, once the data analysis had been completed, a third letter was sent to the participants to arrange the date and time of the interviews (see Appendix

5.6). The first interview thus took place on 7 November 2019, with the final one on 10 January 2020. All interviews were recorded and transcribed. Table 4.5 presents general information about the companies involved, with the participants coded as A, B, and C for confidentiality. As the table shows, the field study covered three different sectors, while two interviewees were financial directors and one interviewee was a management accountant.

Table 4.5: General information about the interviewees

Code	Type of business unit	Interviewee position	Interview Type	Gender	Interview duration time (minutes)
A	Retail of furniture, lighting, and similar (not musical instruments or scores) in specialised store	Financial director	Face-to-face interview	Male	101
B	Other information technology service activities	Financial director	Face-to-face interview	Male	76
C	Business and domestic software development	Management accountant	Face-to-face interview	Female	45

4.4.2.3 Interview data analysis

Qualitative data consists of non-numeric data or non-quantified data (Saunders et al., 2016). There are several approaches to analysing such qualitative data, such as narrative analysis, content analysis and thematic analysis (Saunders et al., 2016). Some analysis is inductive and less structured, while other forms are deductive and more structured. Thus, choosing the qualitative data analysis type depends on the philosophical assumptions of the study being conducted (Saunders et al., 2016).

Thematic analysis was used in this research to analyse the qualitative data, as this approach helps researchers to organise, find, analyse, and report on underlying themes. In addition, this approach offers the ability to highlight the similarities and differences across all qualitative data in a given study (Saunders et al., 2016). This approach can also be used with any philosophical assumptions, including positivist and interpretivist paradigms (Saunders et al., 2016). To enable this, the research had to emphasise and pre-define the framework based on the quantitative analysis stage and prior studies, with contextual variables, non-financial performance, and financial performance being properly defined.

This research used a data matrix to generate thematic analysis (Nadin and Cassell, 2004). A matrix utilises an overlap of two lists, columns and rows, and this research used this format because the aim was to compare different findings between groups, such as examining the differences between business units that adopt ABC or do not adopt ABC (Nadin and Cassell, 2004). The qualitative data analysis thus followed the following steps:

1. All interviews were tape-recorded.
2. All interviews were transcribed.
3. All transcribed text was read once, without any coding, so that the researcher was familiar with the text.
4. Three data matrices were created with different themes/codes such as competition, business strategy, AM., etc.
5. All transcript texts were read again to highlight the parts of the text relevant to the themes.
6. After relevant texts were highlighted, they were labelled with codes.
7. All relevant texts and their codes were moved to the data matrix. The rows represented codes or themes and the columns represented the interviewees.
8. All descriptive codes were grouped to create overarching codes for codes that share common meaning. This is the final stage of the interpretation process, which involves attaching meaning to the codes.

4.5 Ethical considerations

Ethical issues are important in any research project, and a number of key questions regarding the insights, advantages, and practicalities of a study must be answered in each case. Qu and

Dumay (2011) observed that the researcher must safeguard themselves and all those involved in a project, guaranteeing that everyone remains protected throughout the course of the study. As the current research is based on questionnaire and interviews with participants about business issues, there was no risk of physical or psychological harm/distress for either questionnaire respondents or interviewees. In addition, there were no risky activities involved in this research. The researcher conducted this research during normal hours and did no work with potentially threatening people; in addition, no activities were conducted in potentially dangerous environments. In this section, the ethical issues considered by the researcher in relation to the selection of participants, confidentiality and anonymity, and data security are thus discussed.

4.5.1 Selection of participants

As discussed in sub-section 4.4.1.4, this research used the FAME database, available on the University of Sheffield website. The data collection process and participant information sheet were given ethical approval by Sheffield University Management School in April 2018 (see Appendix 6), and following this, the questionnaire, consent form and participant information sheet were sent to participants. Mail, emails and telephone calls were used to contact all prospective interviewees. To ensure that all participants were fully informed about the nature of the study, each individual was provided with an information sheet regarding the objective, methodology, and content of the study, along with information on data protection and privacy as to rights of the respondent. Before taking part in the questionnaire or interviews, informed positive consent was required from each participant. All individuals taking part were also made fully aware that they had the freedom to remove themselves from the study at any point until any findings were published.

4.5.2 Confidentiality and anonymity

Potential respondents to the questionnaire received a letter assuring them that all questionnaire information was to be used for the PhD research and potentially associated conference papers and journal articles, that all data collected would be treated as confidential, and that the identity of the questionnaire respondents remained anonymous. Only the PhD researcher was to have access to the quantitative and qualitative data. In addition, the interviewees received and signed an interview consent form informing them that all data was to be used for the research in the form of the PhD thesis, and associated conference papers and academic journal articles, but that the identity of the interviewees would remain anonymous and their comments would be treated confidentially. The interview consent form also informed the participants that their names would not be disclosed under any circumstances. This document was signed by both the researcher and the interviewees.

4.5.3 Data security

As discussed in sub-section 4.4.1.8, quantitative data was collected using mail or online questionnaires. After collecting the mail questionnaires and online questionnaire, the researcher converted the data provided by participants into Microsoft Excel spreadsheets, which were then encrypted with a password not known by anyone except the researcher. The raw questionnaires and interview data were stored in the researcher home. The quantitative data were analysed by the researcher using statistical software at the University of Sheffield. A recorder was used for the interviews and each recorded interview was saved on a memory card and kept in a locker at the researcher's home. The interview data was later transcribed verbatim by a professional transcription service before the interview data was analysed by the researcher. The data from the questionnaire and interview are to be used only be used for this PhD research and not for any research projects except this research and its associated conference papers and academic journal papers. The questionnaire and interview data will be held for one year after the PhD degree is awarded.

4.6 Conclusion

This chapter discusses the research methodology and methods used in the research. The philosophical assumptions underpinning this research (ontology, epistemology and methodology) were discussed, highlighting that the research was underpinned by a positivist paradigm and thus adopted a quantitative design accompanied by supplementary interviews to examine relevant phenomena in UK non-manufacturing companies; both of these data collection methods contributed towards addressing the research questions. The main database for collecting information about relevant companies was FAME, while the main software package used for analysis of the quantitative data was SEM. The supplementary qualitative data was analysed using thematic analysis.

Chapter 5: Preliminary Results and Measurement Model Analysis

5.1 Introduction

This chapter has two main objectives: (1) to present the findings related to the preliminary analysis; and (2) to assess and validate the measurement models using the confirmatory factor analysis (CFA) diagnostics measurements, which include standardised factor loadings, goodness-of-fit-indices, modification indices, scale reliability, scale validity, and multicollinearity.

This chapter is organised as follows: section 5.2 provides information about the preliminary analysis, data examination and preparation. This includes inconsistent questionnaire answers (5.2.1), missing data analysis (5.2.2) outlier and normality analysis (5.2.3). Section 5.3 presents the assessment of the measurement model using CFA. Section 5.4 includes the validation of the activity-based costing (ABC) adoption, activity analysis (AA) usage, activity-cost analysis (ACA) usage, ABC usage, and cost system sophistication (CSS) measurement models. Finally, section 5.5 presents conclusion for this chapter.

5.2 Preliminary analysis

Prior to any testing or analysis of either the research models or the hypotheses, it is important to clean up, prepare and examine the data in order to ensure that the results are as valid and accurate as possible (Hair et al., 2019; Tabachnick and Fidell, 2019). A preliminary analysis is designed to address any problems related to inconsistent questionnaire answers, missing data analysis, and outlier and normality analysis.

5.2.1 Inconsistent questionnaire answers

Inconsistent answers arise where a participant provides two different answers when asked a question in a slightly different way. Questionnaires that contain these contradictory answers need to be removed from the analysis (Hair et al., 2019). This research removed 19 questionnaires because they included inconsistent answers. Two examples of inconsistent answers found in this research are:

1. When some companies selected option 9 (i.e. other, please specify) for question A_1, that relates to the experience of ABC, and mentioned that they used the variable costing systems (VCSs), then moved on to questions A_5 and A_6, that relate to the number of cost pools and cost drivers, they answered that their company has 15 cost pools and six non-volume cost drivers. It is impossible to include these companies in the analysis as they have contradictory answers. The researcher could not determine whether these companies use VCSs or sophisticated costing systems as companies that use VCSs are not expected to have non-volume cost drivers.

2. When a company reported that they have a greater number of cost drivers than they have cost pools (e.g. three cost pools and eight cost drivers). It is impossible to include these companies in the analysis as the number of cost pools is lower than the number of cost drivers.

5.2.2 Missing data analysis

Missing data refer to incomplete or missing answers for some of questionnaires, where a participant fails to provide one or more answers on the questionnaire. Depending on the extent of the missing data, a number of potential remedies are available (Hair et al., 2019). Consequently, the researcher needs to identify the percentage of missing data for each questionnaire received (Hair et al., 2019). If data is missing more than 10%, or is missing less than 10% but the missing data are related to one variable (e.g. cost structure), then these questionnaires should be removed from the analysis (Hair et al., 2019).[41] The reason for removing the questionnaire with missing values for the cost structure variables is that the cost structure variable is objective, therefore, it would be difficult to impute it. After determining the percentage of missing data, the researcher then needs to examine the pattern, specifically to determine the extent of the missing data, and decide which remedies can be applied. Table 5.1 presents the total percentage of missing values (0.46%). The table also shows that the total number of variables is 47, indicating that the uncompleted variables are higher than the completed data

Table 5.1: Summary of the missing data

	Complete data		Missing data	
	N	%	N	%
Values	9,544	99.54%	44	0.46%
Questionnaires	167	81.86%	37	18.13%
Variables	23	48.93%	24	51.06%

Testing the pattern of missing data means determining whether or not the data were missed completely at random (MCAR) (Hair et al., 2019; Tabachnick and Fidell, 2019). If the data are MCAR, the researcher can select one of several remedies to address this issue (Hair et al., 2019). Little's MCAR test aims to examine the randomness to see whether the missing data can be classified as MCAR (Hair et al., 2019; Tabachnick and Fidell, 2019). This tests for any significant differences between the actual missing data and random data. If no significant differences are found, the missing data are classified as MCAR. Little's MCAR test was performed using the Statistical Package for the Social Sciences (SPSS) and the result of this test (χ^2 = 510.084, df = 1166, p = 1.00), indicated that there was no significant difference between the actual and random data.

[41] As discussed in chapter 4 (sub-section 4.4.1.8), there were eight deleted cases in this research with more than 10% of missing data, even after efforts were made to encourage the participants to provide the missing answers. One case was removed because the cost structure variable was incomplete.

As the current research data is more likely to be missing completely at random, this enabled the researcher to impute the missing data by using the expectation maximisation method. "The expectation maximisation algorithm is an iterative procedure, which aims to estimate the missing values and consists of two steps in each iteration, the expectation step and the maximisation step" (Bennett, 2001, p. 467). This method is the most robust imputation method when applied using SPSS.

5.2.3 Outlier and normality analysis

A univariate outlier test was used in this thesis in order to identify if there are extremely high or low values for one variable. In addition, the study used an outlier to ascertain if there were any unusual combinations of values of two or more variables, i.e. a multivariate outlier (Hair et al., 2019).

In order to detect univariate outliers, the standardised score (z score) is examined to determine the distribution of cases for each variable. The study used the z score for all variables, including those with single or multiple items, and ordinal variables or interval or ratio variables. The z scores should be between +3 and -3 (Kline, 2016). The ordinal variables in this research are activity management (AM) usage (AA, ACA and ABC usage), competition, differentiation strategy, cost leadership strategy, service diversity, service cycle time reduction, service quality, cost reduction, and financial performance. The ratio variables in this research are the number of cost pools, the number of cost drivers, the number of volume cost drivers, and the number of non-volume cost drivers. The interval variables in this research are the number of employees, sales revenue, and capital employed.

Appendix 7.1 shows the standardised scores of the ordinal and interval variables. The z scores have been used to test the ordinal and interval variables and they should be between +3 and -3, but several cases lie outside this range, where the z score ≥ 3. These variables are the number of cost pools, cost drivers, volume and non-volume cost drivers, cost structure, number of employees, sales revenue, and capital employed. These eight outlier variables were remedied based on either the winsorization or transformation methods. Winsorization "involves replacing a fixed number of extreme scores [outliers] with the score that is closest to them in the tail of the distribution in which they occur" (Sheskin, 2003, p. 404). One questionnaire was winsorized for the cost structure variable as it has z score greater than 3; this was by changing one value to make it closer to the other values in the dataset.

The other seven variables were treated by using transformation "Log N". The reason for not using the winsorization method to treat the outlier of seven of the eight outlier indicators (cost pools, cost drivers, volume cost drivers, non-volume cost drivers, number of employees, sales revenue, and capital employed) is that, when the measurement model was run using the winsorization method, the factor loadings were below the acceptance level (< 0.50). In addition, the Cronbach's alpha for the CSS construct and size construct was also below the acceptance level when using the winsorized value of their indicators (< 0.60).[42]

To detect multivariate outliers, "Mahalanobis D^2 evaluates the position of each observation compared with the centre of all observations on a set of variables" (Hair et al., 2019, p. 93). The regression provides a value for the Mahalanobis distance, after which the *p* value was calculated based on the Mahalanobis distance. When some cases included a *p* value equal to or less 0.001, they were considered as multivariate outliers (Tabachnick and Fidell, 2019). Using the 0.001 threshold, it was found that four cases out of the 204 usable responses had a *p* values of 0.001 or below; however, it was decided not to delete these multivariate cases for two

[42] The current research did not apply the log transformation to the cost structure variable as it did not have any issue regarding the measurement model's diagnostics.

reasons: (1) because the findings were unchanged, and (2) these outliers did not affect the normality distribution of the data.

Normality is the most fundamental assumption in multivariate analysis. Normality refers to the shape of the data distribution for each of the variables and its correspondence to the normal distribution (Hair et al., 2019). Skewness and kurtosis can be used to test the shape of the data distribution (Hair et al., 2019). The skewness refers to which variables' distribution is asymmetrical or unbalanced. The variables' distribution suffers from being positively skewed if this indictor's distribution has few large values and tails off to the right, and negatively skewed if this indictor's distribution has few large values and tails off to the left. Kurtosis refers to which variable's distribution has peakedness or flatness to the normal distribution (Hair et al., 2019).

Skewness and kurtosis values between +1 and -1 indicate the normality of the variable's distribution (Hair et al., 2019). Based on these tests, this research found that, apart from a few variables, that showed a modest departure from normality (e.g. service quality has a Kurtosis value equal to -1.08), most of the variables are normal (see Appendix 7.2).[43] Several researchers to date have claimed that non-normality has an insignificant influence on the findings when the sample size is greater than 200 (Field, 2018; Hair et al., 2019).[44]

5.3 The measurement model: confirmatory factor analysis

In chapter 4, sub-section 4.4.1.10, the two components of the structural equation modelling (SEM) were discussed; namely, the measurement model and the structural model. This section

[43] The Skewness and Kurtosis values, presented in Appendix 7.2, are related to the latent constructs. More information about the Skewness and Kurtosis of the items of the latent constructs will be discussed in the descriptive statistics for the structural model in the following chapters.
[44] As discussed in sub-section 4.4.1.8, the sample size of the current research is greater than 200.

aims to test the measurement model by using CFA.[45] It aims to test a model fit between a specified measurement theory and the data collected (Hair et al., 2019; Kline, 2016). CFA tests the validity of the latent constructs. These latent constructs are directly influenced by indicators or measured variables. Thus, CFA aims to test the degree of correlation between the indicators and their constructs (Hair et al., 2019; Kline, 2016). CFA aims to evaluate the measurement model fit by using six diagnostic measures. These measures are: (1) standardised factor loading, (2) the goodness-of-fit-indices (GOF), (3) the modification indices, (4) scale reliability, (5) scale validity, and (6) multicollinearity.

5.3.1 Diagnostic 1: standardised factor loading

The first diagnostic is standardised factor loading. CFA can statistically estimate the direct impact of latent constructs on their indicators or measured variables; this statistical technique is known as standardised factor loading, or standardised regression weight (Hair et al., 2019). The size of the standardised factor loading is an important aspect to test the measurement model because it measures how much of the variance of the observed variables a factor explains. The standardised regression weight or standardised factor loading should be statistically significant, with a standardised loading > 0.50, and a critical ratio (C. R.) > ±1.96. High factor loading between one indicator and the construct (e.g. > 0.50) indicates the strength of the relationship between the latent constructs' indicators (Hair et al., 2019). To achieve the identification conditions, each latent construct should have a minimum of two indicators; "if a standard CFA model has two or more factors where each factor has two or more indicators, then the model is identified" (Kline, 2016, p. 201).[46] This research include variables with a single item, and these variables should be included in the CFA to estimate their correlation with the other latent

[45] The next chapters (chapters 6, 7 and 8) will discuss the structural model and hypothesised results for the ABC adoption model, AM usage model, and CSS model, respectively.
[46] All the latent constructs in the current research have more than two indicators, except for cost reduction, which has two indicators.

constructs to avoid any measurement errors (Kline, 2016). However, these single variables should not be interpreted in the same way as factors as that only represent one item (Kline, 2016). These variables are ABC adoption, AA usage, ACA usage, ABC usage, and cost structure.

5.3.2 Diagnostic 2: goodness-of-fit-indices

The second diagnostic is the goodness-of-fit-indices; this measurement is the most important criterion for identifying the degree of goodness of fit of the measurement model using CFA. The type of fitness indices was discussed in chapter 4, sub-section 4.4.1.10.1, and was divided into three groups.

The first group is the absolute fit indices: (1) Chi-square ($\chi^2, p \geq 0.05$), (2) normed Chi-squared (χ^2/degree of freedom, ≤ 3.0), (3) root mean square error of approximation (RMSEA, ≤ 0.08), (4) degree of freedom (*df*, > 0), and (5) standardised root mean residual (SRMR, ≤ 0.08) (Hair et al., 2019; Blunch, 2012; Kline, 2016; Hu and Bentler, 1998).

The second group is incremental fit indices: (1) comparative fit index (CFI $\geq$ 0.90), (2) incremental fit index (IFI $\geq$ 0.90), and (3) Tucker–Lewis Index (TLI) or non-normed fit index (NNFI, $>$ 0.90) (Hair et al., 2019; Hooper et al., 2008; Hu and Bentler, 1998). The third and final group is parsimony fit indices: (1) parsimony normed fit index (PNFI $\geq$ 0.50) (Blunch, 2012; Hair et al., 2019).

The χ^2 value is expected to be statistically significant when the size of the sample is higher than 200 respondents and/or the measurement model consists of more than 30 measured variables or indicators (Hair et al., 2019; Tabachnick and Fidell, 2019). On the other hand, this research will use the most informative fit indices; specifically, this research will rely on RMSEA and CFI. These two indices are the least sensitive to the effect of data sample size (Hair et al., 2019;

Tabachnick and Fidell, 2019). The measurement model can have a good fit when the measurement model produces a RMSEA value of less than 0.08, and a CFI value of more than 0.90 (Blunch, 2012; Hair et al., 2019). The most important condition to apply for the maximum likelihood estimation (MLE) method for SEM is a large sample size. According to Hair et al. (2019), the minimum sample size is 200 cases. The sample size for the current study is 204, which meets the requirement of n > 200 cases.

5.3.3 Diagnostic 3: modification indices

The third diagnostic measure is modification indices. Modification indices (M.I) aim to calculate every possible relationship that is not specified and estimated in the model (Hair et al., 2019). In other words, it delivers the outcome when an indicator is loaded onto other constructs (cross loading). This can help researchers to improve the model fit by loading indicators onto other latent constructs or by deleting these indicators. "Modification indices of approximately 4.0 or greater suggest that the fit could be improved significantly by freeing the corresponding path to be estimates" (Hair et al., 2019, p. 678). The modification indices should be checked to see whether there is any cross loading. However, deleting indicators or making any other modifications to the measurement model based on the modification indices is not recommended unless it can be justified by theory. "Researchers should consult other residual diagnostics for change suggested by a modification index and then take appropriate action, if justified by theory" (Hair et al., 2019, p. 678).

5.3.4 Diagnostic 4: scale reliability

The fourth diagnostic measure is scale reliability. Reliability testing aims to measure the degree of stability; specifically, it measures the extent to which the measured variables or indicators of a latent construct are internally consistent with each other. Higher reliability values indicate that each latent construct and its indicators seems to be measuring the same thing (Hair et al., 2019). Cronbach's alpha coefficient (α) test is the most common test in quantitative research, which aims to assess the internal consistency and scale reliability (Collis and Hussey, 2014; Hair et al., 2019). The latent constructs can be reliably measured if $\alpha \geq 0.70$ (Hair et al., 2019). However, if the latent constructs are measured by fewer indicators, $\alpha = 0.6$ is acceptable (Al-Omiri and Drury, 2007; Hair et al., 2019). The other measure of internal consistency is composite reliability (CR). This measurement is similar to α but relies on the actual factor loading of measure variables or indicators (Hair et al., 2019). The minimum acceptably reliability value for CR is 0.70 (Hair et al., 2019).

5.3.5 Diagnostic 5: scale validity

The fifth diagnostic measure is scale validity. The final stage after testing the reliability of the latent constructs is to examine the research validity. Validity means the extent to which the measured variables or indicators really measure the concept that they were designed to measure (Bryman and Cramer, 2001). Validity can be tested by content validity and construct validity.

5.3.5.1 Content validity

Content (or face) validity aims to evaluate the degree to which the indicators or measured variables cover the meaning and the content of the concept of the construct variables (Hair et al., 2019). The content validity of the latent constructs of this research is conducted by: (1) piloting or pre-testing the survey questionnaire by distributing 20 questionnaires to 20 non-manufacturing companies, (2) the pilot questionnaires were read by three management accounting academics, and (3) initially the questionnaire included definitions for some of the variables (such as ABC, cost pools, and cost drivers), however, these definitions were reworded using simpler language so that they could be easily understood by the participants.[47]

[47] More information about the piloting of the questionnaire is discussed in chapter 4 (sub-section 4.4.1.2).

5.3.5.2 Construct validity

Construct validity aims to test whether a set of measured variables or indicators actually represent the theoretical purpose of the latent constructs (Hair et al., 2019). Construct validity can be measured in two dimensions: (1) convergent validity, and (2) discriminate validity (Bryman and Cramer, 2001; Hair et al., 2019).

Convergent validity is the extent to which the indicators of specific latent constructs converge by sharing a high proportion of variance between them (Bryman and Cramer, 2001; Hair et al., 2019). To evaluate the convergent validity, the researcher can use the information provided by the CFA measurement model, including the standardised regression weight/standardised factor loading and the average variance extracted (AVE) (Hair et al., 2019). The AVE is the average percentage of variation explained by the indicators of the latent constructs (Hair et al., 2019). If AVE ≥ 0.50, this shows convergent validity (Hair et al., 2019). In other words, the AVE shows that more than half of the variation in the measured variables can be explained by the latent constructs while the remaining percentage shows the unexplained variance between the indicators and their latent constructs (Hair et al., 2019). In addition to AVE as a measurement of convergent validity, it should be greater than the maximum-shared variance (MSV), and the MSV should be greater than the average shared variance (ASV) (i.e. AVE > MSV > ASV) (Jin et al., 2014; Rebelo-Pinto et al., 2014; Uyar and Kuzey, 2016).

The second dimension of construct validity is discriminate validity. The discriminate validity of the construct is the degree to which a latent construct is really different from the other latent constructs (Hair et al., 2019). "[C]ross-loadings are the dominant approaches for evaluating discriminant validity" (Henseler et al., 2015, p. 115). If the findings show a high cross loading, this indicates poor fit indices of the CFA model. The AVE should be greater than the square correlation coefficient (r^2) between the specific latent constructs and other constructs (Hair et al., 2019).

5.3.6 Diagnostic 6: Multicollinearity

The sixth and final diagnostic is multicollinearity. Multicollinearity is the degree to which a variable (either a latent construct or a single item) can be explained by the other variables in the same analysis and they have a high correlation and association between them (Hair et al., 2019). Correlation matrices (r) are recommended to use to test the multicollinearity between three or more variables in the research model (Hair et al., 2019; Kline, 2016). “The simplest and most obvious means of identifying collinearity is an examination of the correlation matrix for the independent variables. The presence of high correlations (generally .90 and higher) is the first indication of substantial collinearity” (Hair et al., 2013, p.196).

5.4 Validating the measurement models

This section will demonstrate the statistical analysis technique to test and evaluate the quality of the measurement models, which is the CFA. To assess the measurement models, an analysis of a moment structures (AMOS) is used in this research. AMOS is a visual or graphics programme for SEM. [48] The current research aims to test five research models; (1) the ABC adoption model, (2) the AA usage model, (3) the ACA usage model, (4) the ABC usage model, and (5) the CSS model. These models present the latent constructs, their indicators and the measured variables, the one single factor, and the standardised regression weight or standardised factor loading between the constructs and their indicators. The latent constructs

[48] There are two different approaches for measuring the latent constructs; namely, the reflective and formative approaches (Hair et al., 2019). The reflective approach assumes that the latent constructs cause the indicators or the measured variables (i.e. the direction of the arrows runs from the latent construct to the indicators). The formative approach assumes that the indicators or measured variables shape the construct and the constructs are not considered as latent factors (i.e. the direction of the arrows runs from the indicators to the construct) (Hair et al., 2019). This research includes only the reflective approach and assumes that all latent constructs cause the indicators. For example, the competition variable in this research is a latent construct and four indicators measure it.

in this research are: (1) competition, (2) service diversity, (3) differentiation strategy, (4) cost leadership strategy, (5) service quality, (6) service cycle time reduction, (7) cost reduction, (8) financial performance, (9) size of the business unit, and (10) CSS. The single factors are: (1) ABC adoption, (2) AA usage, (3) ACA usage, (4) ABC usage, and (5) cost structure. The MLE is used to estimate the measurement parameters and each latent construct as specified, together with its measured variables or indicators. The following sections present assessments of the five measurement models. These models have the same latent constructs and measured variables; however, the dependent variable is changed for each model. The dependent variable for the first model is ABC adoption (sub-section 5.4.1), for the subsequent models they are AA usage (sub-section 5.4.2), ACA usage (sub-section 5.4.3), ABC usage (sub-section 5.4.4), and CSS (sub-section 5.4.5).

5.4.1 Validating the ABC adoption measurement model

5.4.1.1 Assessing the ABC adoption measurement model

There are six diagnostics for assessing the measurement model, as discussed in section 5.3. These diagnostics will be discussed below.

5.4.1.1.1 Standardised factor loading for the ABC adoption model

The first diagnostic is that the factor loading should be greater than 0.50. Figure 5.1 presents the measurement model for ABC adoption, which includes all of the measured variables (cost structure and ABC adoption), and latent constructs with their indicators (competition, service diversity, differentiation strategy, cost leadership strategy, service quality, service cycle time reduction, cost reduction, financial performance, and size). The figure also presents the standardised factor loadings for all indicators, and these are summarised in Table 5.2. In addition, the figure presents the factor correlations between the measured variables and the latent constructs, as well as the error variance of the indicators.

All the measured variables or indicators loaded significantly onto their latent constructs and have a standardised factor loading of > 0.50, except for the factor loading of capital employed which is employed as a measurement of the size construct, which has a standardised factor loading of 0.21. Thus, it was decided to remove this indicator and rerun the ABC adoption measurement model.[49] As shown in Figure 5.2 and Table 5.3, the indicators of size of the business unit are significantly loaded onto their respective construct (size) and have standardised factor loadings greater than 0.50. Relying on the significance and size of the standardised factor loading is one method to test the convergent validity, as discussed in sub-section 5.3.5.2.

[49] The standardised factor loading for number of employees is greater than that in the ABC adoption model. This fact is called the "Heywood case" (Heywood, 1931), which occurs when the standardised factor loading is greater than one and the error variance is negative (Kolenikov and Bollen, 2012). The standardised factor loading can be greater than one if the indicators are highly correlated or if there is a misspecification and few indicators measured the construct. One possible solution when the standardised factor loading is larger than one is to fix the standardised loading to one or use the same constraint labels. As this solution did not work, it was decided to apply the same constraint labels to the number of employees and sales revenue. This method puts equal unstandardized factor loadings on these two indicators.

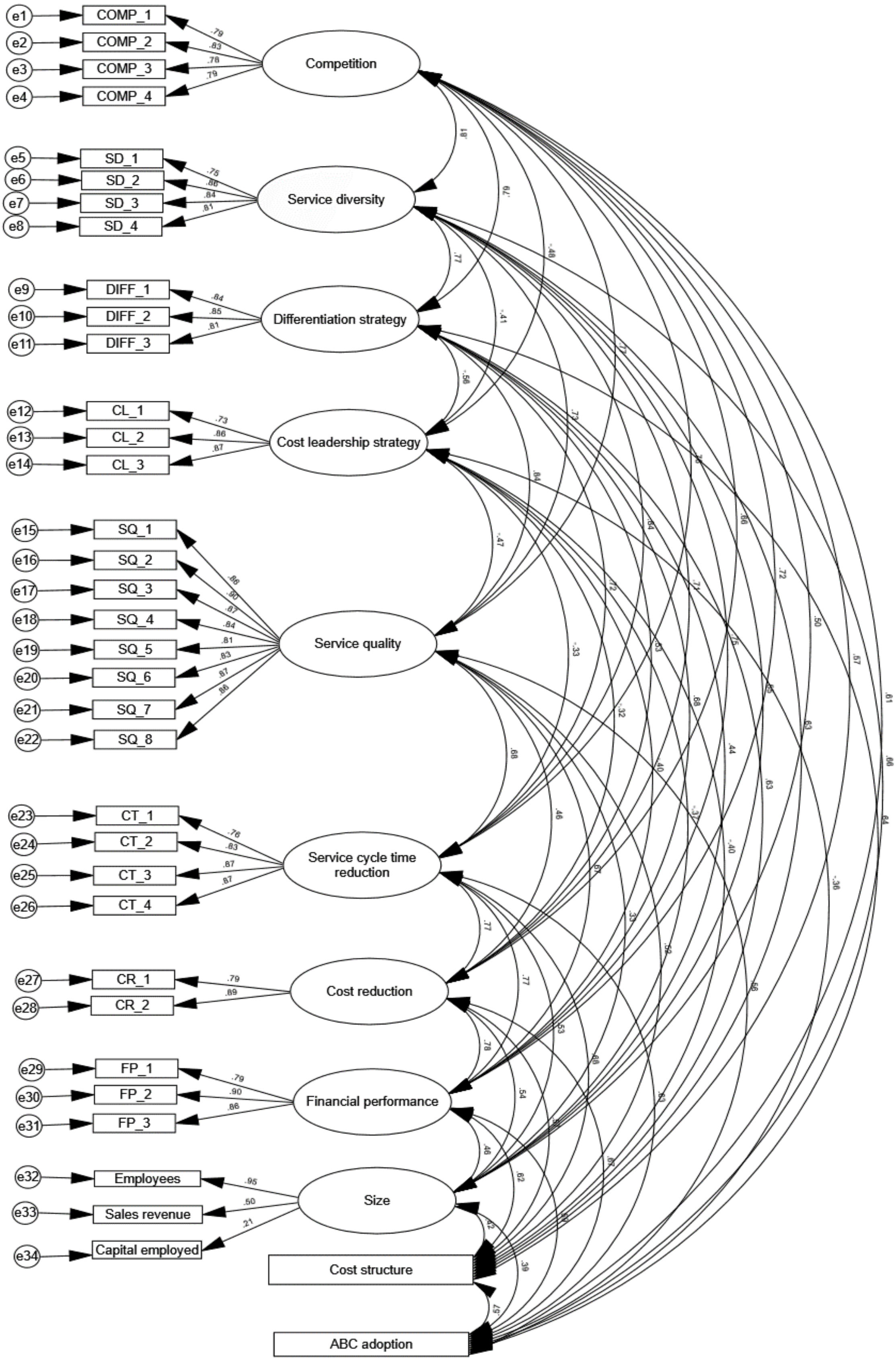


Figure 5.1: The CFA measurement model for the ABC adoption

Table 5.2: The regression weight for the ABC adoption measurement model

			Unstandardized regression weight	S.E.	C.R.	*P*	Standardised regression weight
COMP_1	<---	Competition	1.00				0.79
COMP_2	<---	Competition	1.03	0.08	12.94	0.00*	0.83
COMP_3	<---	Competition	0.99	0.08	11.96	0.00*	0.78
COMP_4	<---	Competition	0.99	0.08	12.24	0.00*	0.79
SD_1	<---	Service diversity	1.00				0.76
SD_2	<---	Service diversity	1.27	0.10	12.71	0.00*	0.86
SD_3	<---	Service diversity	1.23	0.10	12.50	0.00*	0.84
SD_4	<---	Service diversity	1.20	0.10	11.98	0.00*	0.81
DIFF_1	<---	Differentiation strategy	1.00				0.84
DIFF_2	<---	Differentiation strategy	1.03	0.07	14.74	0.00*	0.85
DIFF_3	<---	Differentiation strategy	1.00	0.07	13.60	0.00*	0.81
CL_1	<---	Cost leadership strategy	1.00				0.73
CL_2	<---	Cost leadership strategy	1.36	0.12	11.40	0.00*	0.86
CL_3	<---	Cost leadership strategy	1.60	0.14	11.49	0.00*	0.88
SQ_1	<---	Service quality	1.00				0.86
SQ_2	<---	Service quality	1.13	0.06	18.44	0.00*	0.90
SQ_3	<---	Service quality	1.13	0.07	16.99	0.00*	0.87
SQ_4	<---	Service quality	1.09	0.07	16.18	0.00*	0.85
SQ_5	<---	Service quality	1.09	0.07	14.92	0.00*	0.81
SQ_6	<---	Service quality	1.07	0.07	15.80	0.00*	0.83
SQ_7	<---	Service quality	1.15	0.07	17.24	0.00*	0.87
SQ_8	<---	Service quality	1.20	0.07	16.93	0.00*	0.87
CT_1	<---	Service cycle time reduction	1.00				0.76
CT_2	<---	Service cycle time reduction	1.24	0.10	12.48	0.00*	0.83
CT_3	<---	Service cycle time reduction	1.37	0.10	13.23	0.00*	0.87
CT_4	<---	Service cycle time reduction	1.39	0.11	13.25	0.00*	0.87
CR_1	<---	Cost reduction	1.00				0.79
CR_2	<---	Cost reduction	1.34	0.10	13.17	0.00*	0.89
FP_1	<---	Financial performance	1.00				0.79
FP_2	<---	Financial performance	1.33	0.09	14.29	0.00*	0.90
FP_3	<---	Financial performance	1.29	0.09	13.73	0.00*	0.87
Employees	<---	Size	1.00				0.95
Sales revenue	<---	Size	0.45	0.09	5.19	0.00*	0.50
Capital employed	<---	Size	0.22	0.08	2.72	0.01	0.21

* *p* value < 0.001 (two-tailed).

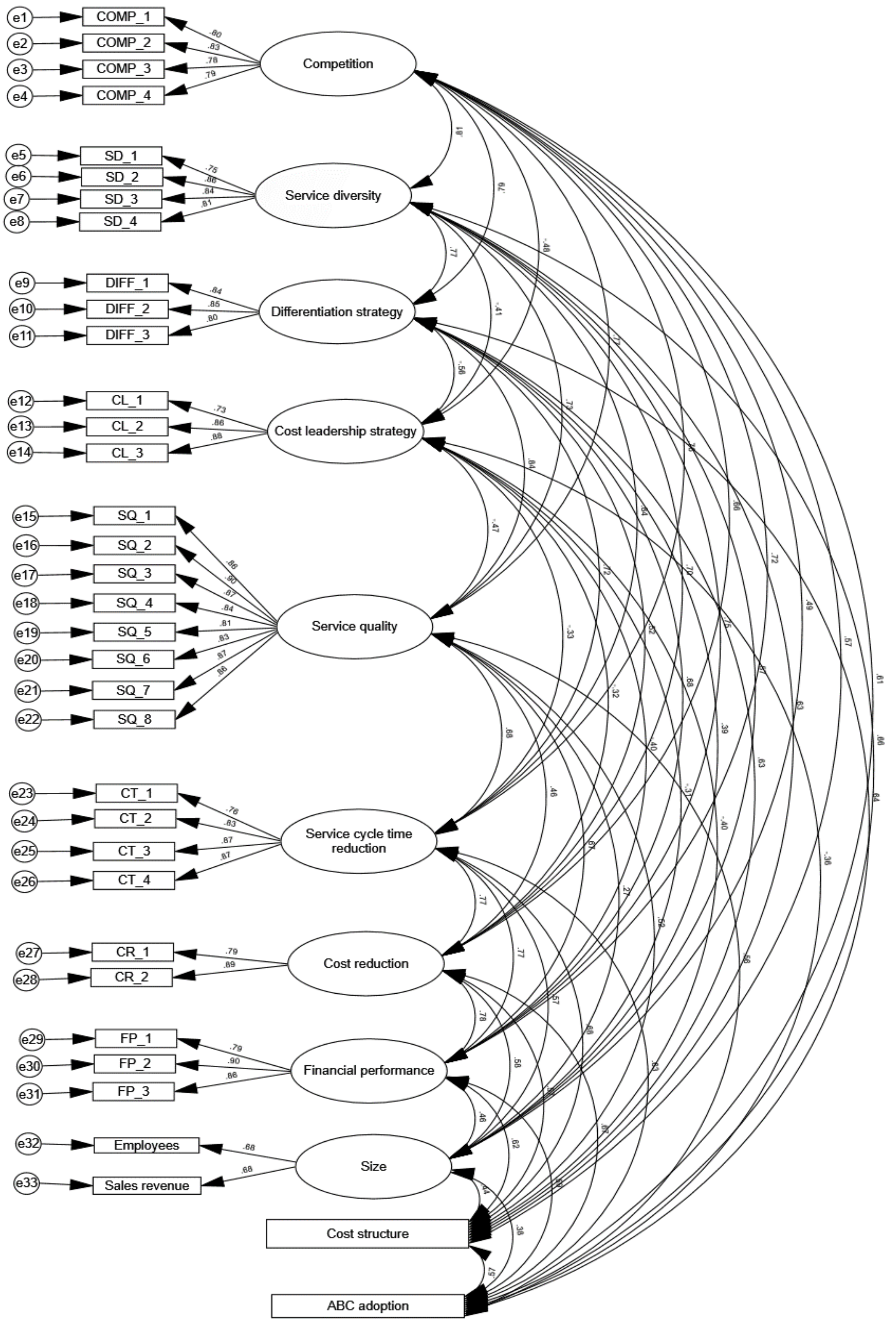


Figure 5.2: The CFA measurement model for the ABC adoption after factor loading consideration

Table 5.3: The regression weight for the ABC adoption measurement model after factor loading consideration

			Unstandardized regression weight	S.E.	C.R.	*P*	Standardised regression weight
COMP_1	<---	Competition	1.00				0.80
COMP_2	<---	Competition	1.03	0.08	12.97	0.00*	0.83
COMP_3	<---	Competition	0.98	0.08	11.98	0.00*	0.78
COMP_4	<---	Competition	0.99	0.08	12.27	0.00*	0.79
SD_1	<---	Service diversity	1.00				0.75
SD_2	<---	Service diversity	1.28	0.10	12.65	0.00*	0.86
SD_3	<---	Service diversity	1.24	0.10	12.46	0.00*	0.84
SD_4	<---	Service diversity	1.20	0.10	11.95	0.00*	0.81
DIFF_1	<---	Differentiation strategy	1.00				0.84
DIFF_2	<---	Differentiation strategy	1.03	0.07	14.75	0.00*	0.85
DIFF_3	<---	Differentiation strategy	1.00	0.07	13.60	0.00*	0.81
CL_1	<---	Cost leadership strategy	1.00				0.73
CL_2	<---	Cost leadership strategy	1.35	0.12	11.37	0.00*	0.86
CL_3	<---	Cost leadership strategy	1.61	0.14	11.50	0.00*	0.88
SQ_1	<---	Service quality	1.00				0.86
SQ_2	<---	Service quality	1.13	0.06	18.45	0.00*	0.90
SQ_3	<---	Service quality	1.13	0.07	16.99	0.00*	0.87
SQ_4	<---	Service quality	1.09	0.07	16.16	0.00*	0.84
SQ_5	<---	Service quality	1.09	0.07	14.91	0.00*	0.81
SQ_6	<---	Service quality	1.08	0.07	15.82	0.00*	0.84
SQ_7	<---	Service quality	1.15	0.07	17.25	0.00*	0.87
SQ_8	<---	Service quality	1.20	0.07	16.92	0.00*	0.87
CT_1	<---	Service cycle time reduction	1.00				0.76
CT_2	<---	Service cycle time reduction	1.24	0.10	12.53	0.00*	0.83
CT_3	<---	Service cycle time reduction	1.36	0.10	13.25	0.00*	0.87
CT_4	<---	Service cycle time reduction	1.39	0.11	13.28	0.00*	0.87
CR_1	<---	Cost reduction	1.00				0.79
CR_2	<---	Cost reduction	1.34	0.10	13.14	0.00*	0.89
FP_1	<---	Financial performance	1.00				0.79
FP_2	<---	Financial performance	1.33	0.09	14.30	0.00*	0.90
FP_3	<---	Financial performance	1.29	0.09	13.73	0.00*	0.86
Employees	<---	Size	0.38	0.03	12.05	0.00*	0.68
Sales revenue	<---	Size	0.38	0.03	12.05	0.00*	0.68

* *p* value < 0.001 (two-tailed).

5.4.1.1.2 Goodness-of-fit-indices for the ABC adoption model

After factor loading consideration, the fitness indices for the ABC adoption model are presented in Table 5.4. Hair et al. (2019) suggested relying on at least one absolute fit index and one incremental fit index. This research found multiple satisfied fitness indices for each group, so these will be presented. In the current research, both of these upper limits are breached. The overall fit of the ABC adoption measurement model is acceptable, with Chi-square χ^2= 1009.090, χ^2/df = 1.99, RMSEA = 0.07, df = 508, SRMR = 0.06, CFI = 0.92, IFI = 0.92, and PNFI = 0.72.

Table 5.4: CFA's fitness indices for the ABC adoption measurement model

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 1009.090, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 1.99$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.07	Satisfied
	df	> 0	$df = 508$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.06	Satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.92	Satisfied
	IFI	≥ 0.90	IFI = 0.92	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.90	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.72	Satisfied

5.4.1.1.3 Modification indices for the ABC adoption model

Appendix 8.1 presents the modification indices for the ABC adoption model after factor loading consideration. Up until this stage, the ABC adoption measurement model does not have any issues relating to reliability and validity. The modification indices can be used if there are any emerging issues regarding the reliability and validity scale. These will be discussed in relation to Diagnostic 5, sub-section 5.4.1.1.5.

5.4.1.1.4 Scale reliability for the ABC adoption model

The single item α = 1:00 and CR = 1:00 comprises the measurement of the ABC adoption and cost structure variables. Table 5.5 reports the Cronbach's alpha as well as the composite reliability for the latent constructs. As the table shows, size of the business unit has the lowest reliability (α = 0.64). The Cronbach's alpha is acceptable, with a value greater than 0.60, specifically for constructs with two indicators (Al-Omiri and Drury, 2007; Hair at al, 2019). The "size" construct in this research has two indicators (number of employees and sales revenue). On the other hand, the reliability estimate of service quality was the highest (α = 0.96 and CR = 0.95). In addition, all of the remaining constructs scored over 0.80.

Table 5.5: The construct reliability for the ABC adoption measurement model

Latent constructs	No. of items	Cronbach's alpha	Composite reliability
Competition	4	0.88	0.85
Service diversity	4	0.89	0.89
Differentiation strategy	3	0.87	0.83
Cost leadership strategy	3	0.85	0.85
Service quality	8	0.96	0.95
Service cycle time reduction	4	0.90	0.89
Cost reduction	2	0.81	0.81
Financial performance	3	0.88	0.88
Size	2	0.64	0.85

5.4.1.1.5 Scale validity for the ABC adoption model

As discussed in section 5.3.5.1, the scale validity contains the construct validity, which includes both the convergent and the discriminate validity. Convergent validity relies on the size of the standardised factor loading and AVE. The size of the factor loading for the ABC adoption model was discussed earlier. All of the measured variables or indicators loaded significantly onto their latent constructs and have a standardised factor loading of > 0.50, except for the factor loading of capital employed.

The AVE for the ABC adoption model is shown in Table 5.6. All constructs exceed the 0.50 AVEs rule of thumb, except for size which is slightly below the recommended minimum (AVE = 0.47). In addition, this research found some unacceptable convergent validity across four latent constructs: (1) service cycle time reduction, (2) differentiation strategy, (3) service diversity, and (4) competition. These four latent constructs have AVE values lower than the MSV.

Table 5.6: AVE, MSV, and ASV for the ABC adoption measurement model

Latent constructs	AVE	MSV	ASV
1 Cost structure	1.00	0.46	0.32
2 ABC adoption	1.00	0.44	0.33
3 Financial performance	0.72	0.61	0.43
4 Cost reduction	0.71	0.61	0.38
5 Service cycle time reduction	0.69	0.71	0.48
6 Service quality	0.74	0.71	0.39
7 Size	0.47	0.34	0.21
8 Cost leadership strategy	0.68	0.32	0.17
9 Differentiation strategy	0.69	0.71	0.45
10 Service diversity	0.67	0.71	0.49
11 Competition	0.64	0.65	0.46

As shown on the diagonal in Table 5.7, presenting the discriminate validity, all constructs have an r^2 smaller than AVE, except between three values: (1) between service diversity and service cycle time reduction ($r^{2\,=}$ 0.71), the square correlation is greater than the AVE of the service cycle time reduction (AVE = 0.69), (2) between the differentiation strategy and service quality ($r^{2\,=}$ 0.71), the square correlation is greater than the AVE of the differentiation strategy (AVE = 0.69), and (3) between competition and service diversity ($r^{2\,=}$ 0.65), the square correlation is greater than the AVE of competition (AVE = 0.64). The measurement model for ABC adoption is rejected because it has issues with three of the discriminate validity values.

Table 5.7: Discriminate validity for the ABC adoption measurement model[a]

	1	2	3	4	5	6	7	8	9	10	11
1 Cost structure	**1.00**										
2 ABC adoption	0.32	**1.00**									
3 Financial performance	0.39	0.35	**0.72**								
4 Cost reduction	0.32	0.44	0.61	**0.71**							
5 Service cycle time reduction	0.46	0.40	0.59	0.59	**0.69**						
6 Service quality	0.27	0.32	0.45	0.22	0.47	**0.74**					
7 Size	0.20	0.14	0.21	0.34	0.33	0.07	**0.47**				
8 Cost leadership strategy	0.16	0.13	0.16	0.10	0.11	0.23	0.10	**0.68**			
9 Differentiation strategy	0.40	0.41	0.46	0.27	0.52	0.71	0.15	0.32	**0.69**		
10 Service diversity	0.40	0.44	0.56	0.50	0.71	0.53	0.32	0.16	0.60	**0.67**	
11 Competition	0.32	0.37	0.52	0.44	0.58	0.60	0.24	0.23	0.63	0.65	**0.64**

[a] Values on the diagonal represent AVE.

To solve the issues related to discriminate validity, the modification indices must be considered, and it must be discerned whether cross loadings occur.[50] Having examined the M.I

[50] Cross loading indicates that an indicator measures several latent constructs (Hair at al., 2019).

for the ABC adoption model (Appendix 8.1), **COM_1**, "The intensity of competition for the major services provided", was removed from the measurement model due to its high covariance (M.I = 5.03) with **SD_1**, "Our business unit requires different processes to design services". **SD_1** was also removed because it has high covariance (M.I = 5.97) with the competition constructs, and (M.I = 8.49) with **CT_1**, "We simplify the work methods to reduce the time associated with value-added activities", so it was decided to remove **CT_1** due to its high covariance (M.I = 7.32) with the service diversity construct. Finally, **DIFF_1**, "We seek to maintain brand identification", was removed from the measurement model due to its high covariance (M.I = 7.18) with the service quality construct. To overcome issues relating to scale validity, it was decided to remove one indicator for the four latent constructs and rerun the ABC measurement adoption, as will be discussed in sub-section 5.4.1.2.

5.4.1.1.6 Multicollinearity for the ABC adoption model

Table 5.8 presents the correlation matrix for each of the variables for the ABC adoption model, which points to the absence of multicollinearity among the research variables, given that the highest correlation is 0.84 between service diversity and service cycle time reduction, and between differentiation strategy and service quality, which is below the 0.90 maximum value suggested by Hair et al. (2013).

Table 5.8: The correlation matrix for the ABC adoption measurement model

	1	2	3	4	5	6	7	8	9	10	11
1 Cost structure	1.00										
2 ABC adoption	0.57	1.00									
3 Financial performance	0.62	0.59	1.00								
4 Cost reduction	0.57	0.67	0.78	1.00							
5 Service cycle time reduction	0.68	0.63	0.77	0.77	1.00						
6 Service quality	0.52	0.57	0.67	0.46	0.68	1.00					
7 Size	0.44	0.38	0.46	0.58	0.57	0.27	1.00				
8 Cost leadership strategy	-0.40	-0.36	-0.40	-0.32	-0.33	-0.48	-0.31	1.00			
9 Differentiation strategy	0.63	0.64	0.68	0.52	0.72	0.84	0.39	-0.56	1.00		
10 Service diversity	0.63	0.66	0.75	0.71	0.84	0.73	0.57	-0.41	0.77	1.00	
11 Competition	0.57	0.61	0.72	0.66	0.76	0.77	0.49	-0.48	0.79	0.81	1.00

5.4.1.2 The ABC adoption measurement model after the diagnostics

CFA was conducted to evaluate the ABC adoption measurement model following the diagnostics described in sub-section 5.4.1.1. Figure 5.3 shows the ABC adoption measurement model after the diagnostics. All of the indicators are significantly loaded onto their respective latent constructs and have standardised factor loadings greater than 0.50 (see Table 5.9). Table 5.10 presents the fitness indices for the complete measurement model. The overall fit of the ABC adoption measurement model is acceptable, with Chi-square $\chi^2 = 657.109$, $\chi^2/df = 1.72$, RMSEA = 0.06, $df = 382$, SRMR = 0.06, CFI = 0.95, IFI = 0.95, TLI or NNFI = 0.93, and PNFI = 0.72. Therefore, the current research shows that the ABC adoption model fits the sample data, as the ABC adoption measurement model's fitness indices exceed the minimum requirement for an acceptable measurement model fit.

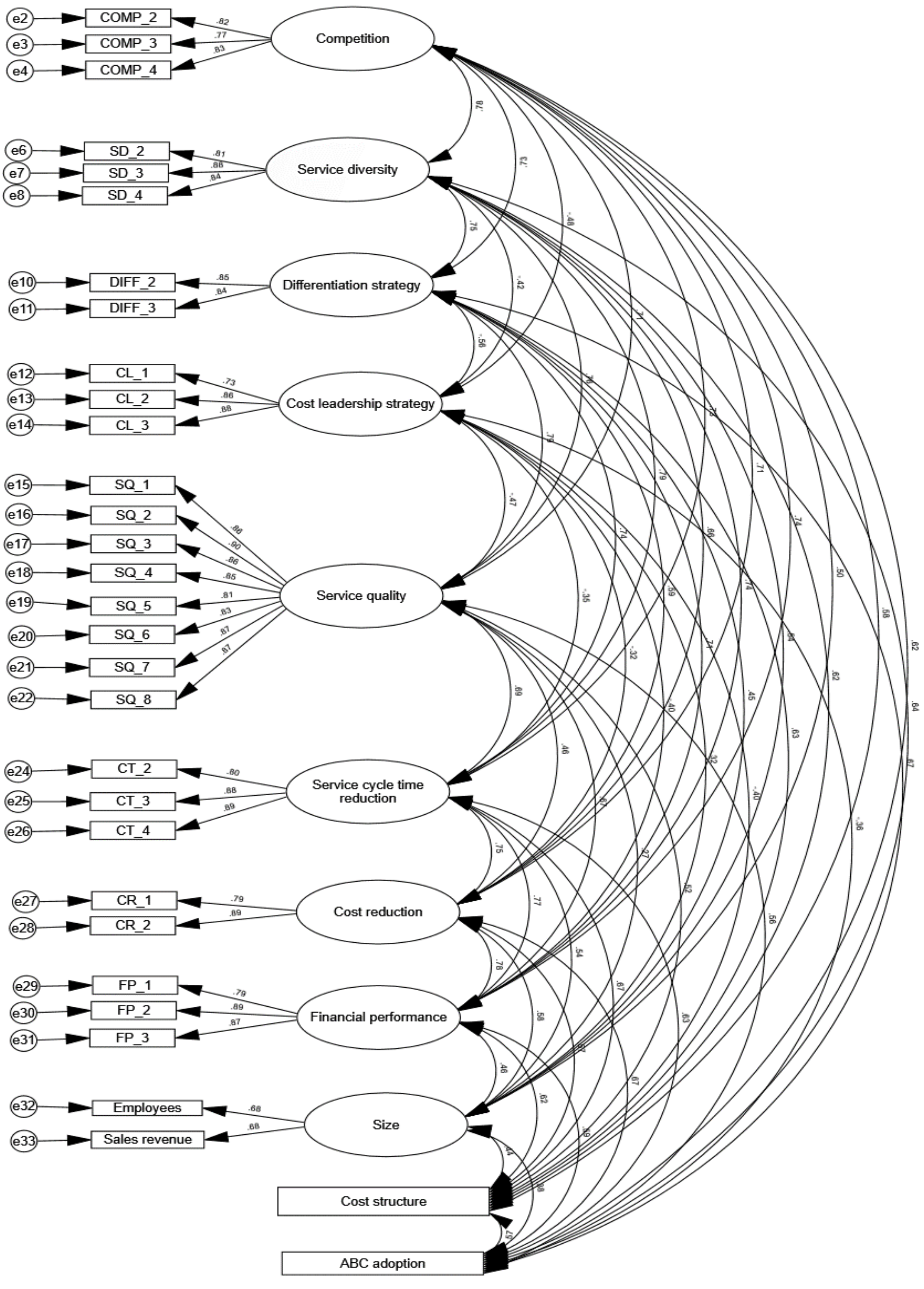


Figure 5.3: The CFA measurement model for the ABC adoption after the diagnostics

Table 5.9: The regression weight for the ABC adoption measurement model after the diagnostics

			Unstandardized regression weight	S.E.	C.R.	*P*	Standardised regression weight
COMP_2	<---	Competition	1.00				0.82
COMP_3	<---	Competition	0.95	0.08	11.95	0.00*	0.77
COMP_4	<---	Competition	1.01	0.08	13.24	0.00*	0.83
SD_2	<---	Service diversity	1.00				0.81
SD_3	<---	Service diversity	1.07	0.07	14.64	0.00*	0.88
SD_4	<---	Service diversity	1.03	0.07	13.83	0.00*	0.84
DIFF_2	<---	Differentiation strategy	1.00				0.85
DIFF_3	<---	Differentiation strategy	1.02	0.07	13.95	0.00*	0.84
CL_1	<---	Cost leadership strategy	1.00				0.73
CL_2	<---	Cost leadership strategy	1.36	0.12	11.35	0.00*	0.86
CL_3	<---	Cost leadership strategy	1.61	0.14	11.45	0.00*	0.88
SQ_1	<---	Service quality	1.00				0.86
SQ_2	<---	Service quality	1.13	0.06	18.43	0.00*	0.90
SQ_3	<---	Service quality	1.13	0.07	16.90	0.00*	0.87
SQ_4	<---	Service quality	1.09	0.07	16.18	0.00*	0.85
SQ_5	<---	Service quality	1.09	0.07	14.92	0.00*	0.81
SQ_6	<---	Service quality	1.08	0.07	15.79	0.00*	0.83
SQ_7	<---	Service quality	1.15	0.07	17.24	0.00*	0.87
SQ_8	<---	Service quality	1.20	0.07	16.92	0.00*	0.87
CT_2	<---	Service cycle time reduction	1.00				0.80
CT_3	<---	Service cycle time reduction	1.16	0.08	14.67	0.00*	0.89
CT_4	<---	Service cycle time reduction	1.18	0.08	14.73	0.00*	0.89
CR_1	<---	Cost reduction	1.00				0.79
CR_2	<---	Cost reduction	1.34	0.10	13.08	0.00*	0.89
FP_1	<---	Financial performance	1.00				0.79
FP_2	<---	Financial performance	1.32	0.09	14.30	0.00*	0.89
FP_3	<---	Financial performance	1.29	0.09	13.77	0.00*	0.87
Employees	<---	Size	0.38	0.03	12.06	0.00*	0.69
Sales revenue	<---	Size	0.38	0.03	12.06	0.00*	0.68

* p value < 0.001 (two-tailed).

Table 5.10: The CFA's fitness indices for the ABC adoption measurement model after the diagnostics

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	χ^2= 657.109, $p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	χ^2/df=1.72	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.06	Satisfied
	df	> 0	*df* = 382	Satisfied
	SRMR	≤ 0.08	SRMR = 0.06	Satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.95	Satisfied
	IFI	≥ 0.90	IFI = 0.95	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.93	Satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.72	Satisfied

As shown in Table 5.11, the construct reliability values for the latent constructs in the ABC adoption measurement model after the diagnostics are accepted.

Table 5.11: The construct reliability for the ABC adoption measurement model after the diagnostics

	No. of items	Cronbach's alpha	Composite reliability
Competition	3	0.85	0.82
Service diversity	3	0.88	0.88
Differentiation strategy	2	0.83	0.78
Cost leadership strategy	3	0.85	0.85
Service quality	8	0.96	0.95
Service cycle time reduction	3	0.89	0.88
Cost reduction	2	0.81	0.81
Financial performance	3	0.88	0.88
Size	2	0.64	0.85

For the scale validity, the AVE for the ABC adoption model after the diagnostics is presented in Table 5.12. All constructs exceed the 0.50 AVE minimum value, except for size (AVE = 0.47), which is slightly below the recommended value (0.50). This value is acceptable for three reasons: (1) because it is slightly below the recommended value, (2) because the size construct was measured by two indicators (Hair et al., 2019), and (3) an AVE less than 0.50 is acceptable if the composite reliability is higher than 0.60 (Fornell and Larcker, 1981). All of the variables have AVE values greater than MSV, and MSV values are greater than the ASV. With regard to the discriminate validity, as shown on the diagonal in Table 5.13, all constructs have an r^2 smaller than the AVE.

Table 5.12: AVE, MSV, and ASV for the ABC adoption measurement model after the diagnostics

Latent constructs	AVE	MSV	ASV
1 Cost structure	1.00	0.46	0.32
2 ABC adoption	1.00	0.44	0.33
3 Financial performance	0.72	0.61	0.43
4 Cost reduction	0.71	0.61	0.39
5 Service cycle time reduction	0.74	0.63	0.46
6 Service quality	0.74	0.63	0.37
7 Size	0.47	0.34	0.21
8 Cost leadership strategy	0.68	0.32	0.17
9 Differentiation strategy	0.71	0.63	0.45
10 Service diversity	0.72	0.63	0.46
11 Competition	0.65	0.61	0.44

Table 5.13: Discriminate validity for the ABC adoption measurement model after the diagnostics[a]

	1	2	3	4	5	6	7	8	9	10	11
1 Cost structure	**1.00**										
2 ABC adoption	0.32	**1.00**									
3 Financial performance	0.39	0.35	**0.72**								
4 Cost reduction	0.32	0.44	0.61	**0.71**							
5 Service cycle time reduction	0.46	0.39	0.59	0.56	**0.74**						
6 Service quality	0.27	0.32	0.45	0.22	0.48	**0.74**					
7 Size	0.20	0.14	0.21	0.34	0.29	0.07	**0.47**				
8 Cost leadership strategy	0.16	0.13	0.16	0.10	0.12	0.22	0.10	**0.68**			
9 Differentiation strategy	0.40	0.44	0.50	0.35	0.56	0.63	0.20	0.32	**0.71**		
10 Service diversity	0.38	0.41	0.54	0.44	0.63	0.58	0.29	0.18	0.57	**0.72**	
11 Competition	0.33	0.38	0.54	0.50	0.53	0.51	0.25	0.23	0.53	0.61	**0.65**

[a] Values on the diagonal represent AVE.

Table 5.14 presents the correlation matrix for each of the variables for the ABC adoption model after the diagnostics, which points to the absence of multicollinearity among the research variables, given that the highest correlation is 0.79 between service diversity and service cycle time reduction, and between differentiation strategy and service quality, which is below the 0.90 minimum value suggested by Hair et al. (2013).

Table 5.14: The correlation matrix for the ABC adoption measurement model after the diagnostics

	1	2	3	4	5	6	7	8	9	10	11
1 Cost structure	1.00										
2 ABC adoption	0.57	1.00									
3 Financial performance	0.62	0.59	1.00								
4 Cost reduction	0.57	0.67	0.78	1.00							
5 Service cycle time reduction	0.68	0.63	0.77	0.75	1.00						
6 Service quality	0.52	0.57	0.67	0.47	0.69	1.00					
7 Size	0.45	0.38	0.46	0.58	0.54	0.27	1.00				
8 Cost leadership strategy	-0.40	-0.36	-0.40	-0.32	-0.35	-0.47	-0.32	1.00			
9 Differentiation strategy	0.63	0.67	0.71	0.59	0.75	0.79	0.45	-0.56	1.00		
10 Service diversity	0.62	0.64	0.74	0.66	0.79	0.76	0.54	-0.42	0.75	1.00	
11 Competition	0.58	0.62	0.74	0.71	0.73	0.71	0.50	-0.48	0.73	0.78	1.00

5.4.2 Validating the AA usage measurement model

5.4.2.1 Assessing the AA usage measurement model

As discussed in sub-section 5.4.1.1.1, the first diagnostic is checking that the standardised factor loading for each indicator is ≥ 0.50. It was decided to remove the capital employed indicator of size construct, as it has a factor loading = 0.21.[51] Appendix 8.2.1 presents the CFA measurement model for AA usage after considering the factor loading. Appendix 8.2.2 presents the regression weight for the AA usage model after considering the factor loading.

The second diagnostic involves checking the fitness indices (see Appendix 8.2.3). The overall fit of the AA usage measurement model is acceptable, with Chi-square $\chi^2 = 1019.030$, $\chi^2/df = 2.01$, RMSEA = 0.07, *df* = 508, SRMR = 0.06, CFI = 0.91, IFI = 0.91, and PNFI = 0.72. The third diagnostic involves checking the modification indices. Appendix 8.2.4 presents the modification indices for the AA usage model after considering the factor loading. Until this stage, the AA usage measurement model does not have any problems. The modification indices can be used if any issues with the reliability and validity scale emerge, as discussed below relating to Diagnostic 5.

The fourth diagnostic involves checking the scale reliability. The scale reliability for all of the latent constructs and measured variables has the same values, as presented above in the section on the ABC adoption model (see Table 5.5, sub-section 5.4.1.1.4). The AA usage variable was measured by one item (α = 1:00 and CR = 1:00). The fifth diagnostic involves checking the scale validity (see Appendix 8.2.5). As shown in Table 5.6, in sub-section 5.4.1.1.5, the scale validity for the latent constructs and measured variables for the AA usage model has the same values as those in the ABC adoption model in terms of the AVE, MSV and ASV values. However, the ASV values are slightly different between ABC adoption and AA usage models. The AA usage variable has AVE = 1:00, MSV=0.03, and ASV=0.02, which is considered acceptable.

[51] It applies also to all of other AM usage models (ACA and ABC usage).

The discriminate validity for the AA usage variable is presented in Table 5.15. This table only presents the discriminate validity for the AA usage variable because all of the latent constructs and measured variables have the same discriminate validity, as presented in Table 5.7 (sub-section 5.4.1.1.5). The measurement model for the AA usage model is acceptable for the AA usage variable, but not for three of the discriminate validity values (as discussed in sub-section 5.4.1.1.5). To solve these issues, the modification indices must be considered, and the cross loadings' occurrences investigated. As a further refinement, by examining the M.I for the AA usage model (Appendix 8.2.4), **COM_1**, "The intensity of competition for the major services provided", was removed from the measurement model due to its high covariance (M.I = 5.35) with **SD_1**, "Our business unit requires different processes to design services". **SD_1** was also removed because it has high covariance (M.I = 5.69) with the competition constructs, and (M.I = 8.32) with **CT_1**, "We simplify the work methods to reduce the time associated with value-added activities", so it was decided to remove **CT_1** due to its high covariance (M.I = 6.76) with the service diversity construct. Finally, **DIFF_1**, "We seek to maintain brand identification", was removed from the measurement model due to its high covariance (M.I = 6.76) with the service quality construct.

Table 5.15: Discriminate validity for the AA usage measurement model[a]

	1 AA usage
1 AA usage	**1.00**
2 Cost structure	0.02
3 Financial performance	0.03
4 Cost reduction	0.01
5 Service cycle time reduction	0.02
6 Service quality	0.01
7 Size	0.03
8 Cost leadership strategy	0.03
9 Differentiation strategy	0.02
10 Service diversity	0.02
11 Competition	0.03

[a] Values in bold represent AVE.

The Final Diagnostic involves checking the multicollinearity (see Table 5.16). Table 5.16 only presents the *r*-value for the AA usage variable because all of the latent constructs and measured variables have the same *r* value, as presented in Table 5.8 (sub-section 5.4.1.1.6). Table 5.16 indicates that there is an absence of multicollinearity in the AA usage variable.

Table 5.16: The correlation matrix for the AA usage measurement model

	1 AA usage
1 AA usage	1.00
2 Cost structure	0.13
3 Financial performance	0.18
4 Cost reduction	0.08
5 Service cycle time reduction	0.14
6 Service quality	0.12
7 Size	0.18
8 Cost leadership strategy	-0.16
9 Differentiation strategy	0.14
10 Service diversity	0.16
11 Competition	0.18

5.4.2.2 The AA usage measurement model after the diagnostics

The AA usage model is acceptable in terms of meeting the various diagnostics. Appendices 8.2.6 and 8.2.7 show the AA usage measurement model together with its regression weight (after the diagnostics), respectively. All indicators have standardised factor loadings greater than 0.50. The overall fit of the AA usage measurement model is acceptable (see Appendix 8.2.8), with Chi-square $\chi^2 = 662.226$, $\chi^2/df = 1.73$, RMSEA = 0.06, $df = 382$, SRMR = 0.06, CFI = 0.94, IFI = 0.94, TLI or NNFI = 0.93, and PNFI = 0.72.

As shown in Table 5.11, sub-section 5.4.1.2, the construct reliability values for the latent constructs in the AA usage measurement model after the diagnostics have the same values as those presented in the ABC adoption model. The AA usage variable was measured by one item (α = 1:00 and CR = 1:00). As shown in Table 5.12, sub-section 5.4.1.2, the scale validity for the latent constructs and measured variables for the AA usage model after the diagnostics has the same values as the ABC adoption model in terms of the AVE, MSV and ASV values.

However, the ASV values are slightly different between the ABC adoption and AA usage models (see Appendix 8.2.9). The AA usage variable has AVE = 1:00, MSV=0.03, and ASV=0.02. These are the same values as before the diagnostics and no change was made to this variable. With regard to discriminate validity, as shown in Table 5.17, AA usage has an r^2 smaller than AVE. For more details about the discriminate validity across the other latent constructs and measured variables after the diagnostics, see Table 5.13. Table 5.18 presents the correlation matrix for AA usage after the diagnostics, indicating the absence of multicollinearity.

Table 5.17: Discriminate validity for the AA usage measurement model after the diagnostics[a]

	1 AA usage
1 AA usage	**1.00**
2 Cost structure	0.02
3 Financial performance	0.03
4 Cost reduction	0.01
5 Service cycle time reduction	0.01
6 Service quality	0.02
7 Size	0.03
8 Cost leadership strategy	0.03
9 Differentiation strategy	0.01
10 Service diversity	0.02
11 Competition	0.02

[a] Values in bold represent AVE.

Table 5.18: The correlation matrix for the AA usage measurement model after the diagnostics

	1 AA usage
1 AA usage	**1.00**
2 Cost structure	0.13
3 Financial performance	0.18
4 Cost reduction	0.08
5 Service cycle time reduction	0.12
6 Service quality	0.12
7 Size	0.18
8 Cost leadership strategy	-0.16
9 Differentiation strategy	0.11
10 Service diversity	0.14
11 Competition	0.15

5.4.3 Validating the ACA usage measurement model

5.4.3.1 Assessing the ACA usage measurement model

The CFA measurement model for the ACA uses the following factor loading consideration, as displayed in Appendix 8.3.1, and the regression weight of the model arising from the consideration of the factor loading is shown in Appendix 8.3.2. Appendix 8.3.3 conveys the checking of the fitness indices. This constitutes the second diagnostic. With Chi-square χ^2 = 1021.19, χ^2/df = 2.01, RMSEA = 0.07, df = 508, SRMR = 0.06, CFI = 0.91, IFI = 0.91, and PNFI = 0.72, it is evident that the fit of the ACA usage model is adequate. In Appendix 8.3.4, the modification indices for the ACA usage model following the consideration of the factor loading can be seen, and this process of checking the indices comprises the third diagnostic. The ACA model does not cause any problems until this phase is reached. As outlined below, pertaining to diagnostic five, issues in terms of the validity scale and reliability are resolved using the modification indices.

Scale reliability pertains to the latent constructs and all measured variables possess equal values to those displayed in the ABC adoption model. This process of checking the scale reliability comprises the fourth diagnostic. In sub-section 5.4.1.1.4, Table 5.5 conveys these. The single item α = 1:00 and CR = 1:00 comprises the measurement of the ACA usage variable.

The scale validity is assessed as part of the fifth diagnostic. This is shown in Appendix 8.3.5. The values for the ABC adoption model in terms of AVE and MSV were identical with the scale validity (pertaining to both measured variables, and latent constructs, for the ACA usage model). There is minimal differentiation in terms of the ACA model and ABC adoption, with the ACA having AVE = 1:00, MSV=0.07, and ASV=0.03.

Table 5.19 shows the ACA usage variable's discriminate validity, which is displayed on its own because the measured variables and latent constructs have the same discriminate validity (see Table 5.7). As mentioned in sub-section 5.4.1.1.5, whilst the measurement model for the ACA model is adequate for the usage variable, three of the discriminate validity values are not. The occurrence of cross loadings needs to be considered in resolving these issues and proper consideration must be made of the modification indices. As a further refinement, by examining the M.I for the ACA usage model (Appendix 8.3.4), **COM_1**, "The intensity of competition for the major services provided", was removed from the measurement model due to its high covariance (M.I = 5.59) with **SD_1**, "Our business unit requires different processes to design services". **SD_1** was also removed because it has high covariance (M.I = 5.36) with the competition constructs, and (M.I = 8.26) with **CT_1**, "We simplify the work methods to reduce the time associated with value-added activities", so it was decided to remove **CT_1** due to its high covariance (M.I = 6.65) with the service diversity construct. Finally, **DIFF_1**, "We seek to maintain brand identification", was removed from the measurement model due to its high covariance (M.I = 6.47) with the service quality construct.

Table 5.19: Discriminate validity for the ACA usage measurement model[a]

	1 ACA usage
1 ACA usage	**1.00**
2 Cost structure	0.02
3 Financial performance	0.03
4 Cost reduction	0.00
5 Service cycle time reduction	0.02
6 Service quality	0.04
7 Size	0.03
8 Cost leadership strategy	0.03
9 Differentiation strategy	0.04
10 Service diversity	0.05
11 Competition	0.07

[a] Values in bold represent AVE.

The process of checking the multicollinearity (as shown in Table 5.20) comprises the last diagnostic. Due to the fact that the measured variables and latent constructs possess the same *r* values, as shown in Table 5.8, the table here only displays the *r* value for the ACA usage variable. A clear absence of multicollinearity in the ACA usage variable is apparent in the table.

Table 5.20: The correlation matrix for the ACA usage measurement model

	1 ACA usage
1 ACA usage	1.00
2 Cost structure	0.13
3 Financial performance	0.19
4 Cost reduction	0.05
5 Service cycle time reduction	0.14
6 Service quality	0.21
7 Size	0.18
8 Cost leadership strategy	-0.18
9 Differentiation strategy	0.19
10 Service diversity	0.22
11 Competition	0.26

5.4.3.2 The ACA usage measurement model after the diagnostics

The model is acceptable across all of the diagnostics. The ACA usage measurement model after the diagnostics and the ACA usage measurement model's regression weight are shown in Appendices 8.3.6 and 8.3.7. The indicators all have standardised factor loadings higher than 0.50. As shown in Appendix 8.3.8, taken as a whole, the fit of the model is acceptable, with Chi-square $\chi^2 = 669.965$, $\chi^2/df = 1.76$, RMSEA = 0.06, $df = 382$, SRMR = 0.06, CFI = 0.94, IFI = 0.94, TLI or NNFI = 0.93, and PNFI = 0.72.

When looking at the ACA usage measurement model after the diagnostics, the construct reliability values and the latent constructs within it have the same values as shown in the ABC adoption model (refer to Table 5.11, sub-section 5.4.1.1.2). One item measured the ACA usage variable (α = 1:00 and CR = 1:00). Regarding the AVE and MSV values, the scale validity constructs and measured variables in the ACA usage model following the diagnostics have the same values as the ABC adoption model (see Table 5.12). A minor difference emerged between the ACA usage models and ABC adoption in terms of the ASV values, as shown in Appendix 8.3.9. No change was made in terms of the AVE, MSV and ASV values of the ACA usage variable, with the values remaining the same, at AVE = 1:00, MSV=0.05, and ASV=0.03. The ACA usage had r^2 smaller than AVE in terms of discriminate validity (see Table 5.21). Table 5.13 provides greater detail about the discriminate validity across the other latent constructs and measured variables following the diagnostics. The correlation matrix for the ACA usage following the diagnostics is shown in Table 5.22, highlighting the absence of multicollinearity.

Table 5.21: Discriminate validity for the ACA usage measurement model after the diagnostics[a]

	1 ACA usage
1 ACA usage	**1.00**
2 Cost structure	0.02
3 Financial performance	0.03
4 Cost reduction	0.00
5 Service cycle time reduction	0.02
6 Service quality	0.04
7 Size	0.03
8 Cost leadership strategy	0.03
9 Differentiation strategy	0.03
10 Service diversity	0.04
11 Competition	0.05

[a] Values in bold represent AVE.

Table 5.22: The correlation matrix for the ACA usage measurement model after the diagnostics

	1 ACA usage
1 ACA usage	1.00
2 Cost structure	0.13
3 Financial performance	0.19
4 Cost reduction	0.05
5 Service cycle time reduction	0.13
6 Service quality	0.21
7 Size	0.18
8 Cost leadership strategy	-0.18
9 Differentiation strategy	0.17
10 Service diversity	0.20
11 Competition	0.22

5.4.4 Validating the ABC usage measurement model

5.4.4.1 Assessing the ABC usage measurement model

The CFA model for ABC usage, following the consideration of factor loadings is shown in Appendix 8.4.1. The regression weight for the usage model following the consideration of factor loading is displayed in Appendix 8.4.2. Conducting a check of the fitness indices (as in Appendix 8.4.3) comprises the second diagnostic. The ABC usage measurement model was found to have an acceptable fit, with Chi-square $\chi^2 = 1029.83$, $\chi^2/df = 2.00$, RMSEA = 0.07, $df = 508$, SRMR = 0.06, CFI = 0.92, IFI = 0.92, and PNFI = 0.72.

The modification indices are then checked as the third diagnostic. Modification indices for the usage model following the consideration of factor loading are shown in Appendix 8.4.4. The ABC usage measurement model does not present issues until this phase. As outlined in the subsequent section on the fifth diagnostic, issues arising in terms of the reliability and validity can be resolved using modification indices.

The scale reliability is then checked (the fourth diagnostic). The values of the scale reliability of the latent constructs and measured variables and of those of the ABC adoption model are identical (as shown in Table 5.5). One item measured the ABC usage variable: α = 1:00 and CR = 1:00. The scale validity is then checked – the fifth diagnostic. This is outlined in detail in Appendix 8.4.5 (see Table 5.6, sub-section 5.4.1.1.5). Insofar as the AVE and MSV values are concerned, the ABC adoption model and the ABC usage model had scale validity for the latent constructs and measured variables with the same values. There remains a minor difference between the ABC usage model and the ABC adoption model in terms of the MSV and ASV values. The ABC usage variable is acceptable, with AVE = 1:00, MSV=0.48, and ASV=0.36.

In Table 5.23, which displays the discriminate validity for the ABC usage variable, the latent constructs and measured variables have the same discriminate validity, as shown in Table 5.7, so the table only contains the discriminate validity for the ABC usage variable. It shows that the measurement model is acceptable for the ABC usage variable but, across three discriminate validity values, there was no acceptability. This is further outlined and discussed in sub-section 5.4.1.1.5. The occurrence of cross loadings may be a factor here, and the resolution of these issues requires a greater consideration of the modification indices.

As a further refinement, by examining the M.I for the ABC usage model (Appendix 8.4.4), **COM_1**, “The intensity of competition for the major services provided”, was removed from the measurement model due to its high covariance (M.I = 5.20) with **SD_1**, "Our business unit requires different processes to design services". **SD_1** was also removed because it has high covariance (M.I = 5.62) with the competition constructs, and (M.I = 8.54) with **CT_1**, "We simplify the work methods to reduce the time associated with value-added activities", so it was decided to remove **CT_1** due to its high covariance (M.I = 7.59) with the service diversity construct. Finally, **DIFF_1**, "We seek to maintain brand identification", was removed from the measurement model due to its high covariance (M.I = 6.08) with the service quality construct.

Table 5.23: Discriminate validity for the ABC usage measurement model[a]

	1 ABC usage
1 ABC usage	**1.00**
2 Cost structure	0.29
3 Financial performance	0.33
4 Cost reduction	0.41
5 Service cycle time reduction	0.43
6 Service quality	0.42
7 Size	0.11
8 Cost leadership strategy	0.19
9 Differentiation strategy	0.48
10 Service diversity	0.44
11 Competition	0.47

[a]Values in bold represent AVE.

As shown in Table 5.24, the multicollinearity is then checked – this is the final diagnostic. Due to the fact that the latent constructs and measured variables have equal *r* values (see Table 5.8), only the *r* value for the ABC usage variable is shown. A clear absence of multicollinearity in the usage variable is shown in Table 5.24.

Table 5.24: The correlation matrix for the ABC usage measurement model

	1 ABC usage
1 ABC usage	1.00
2 Cost structure	0.54
3 Financial performance	0.58
4 Cost reduction	0.64
5 Service cycle time reduction	0.66
6 Service quality	0.65
7 Size	0.34
8 Cost leadership strategy	-0.43
9 Differentiation strategy	0.70
10 Service diversity	0.67
11 Competition	0.69

5.4.4.2 The ABC usage measurement model after the diagnostics

Across all diagnostics, the ABC usage model was acceptable. The ABC usage measurement model, following the diagnostics, and the regression weight for the ABC usage measurement model are shown in Appendices 8.4.6 and 8.4.7. A standardised factor loading higher than 0.50 occurred for all indicators. The fit of the overall usage measurement model was acceptable, with Chi-square χ^2 = 661.733, χ^2/df = 1.73, RMSEA = 0.06, df = 382, SRMR = 0.06, CFI = 0.95, IFI = 0.95, TLI or NNFI = 0.93, and PNFI = 0.72. This can be seen in Appendix 8.4.8.

The same construct reliability and latent construct values presented in the ABC adoption model were found in the ABC usage measurement model, following the diagnostics (see Table 5.11). One item measured the ABC usage variable: α = 1:00 and CR = 1:00. In terms of the AVE and MSV values, the ABC usage model's scale validity for the latent constructs and measured variables after the diagnostics had the same values as the ABC adoption model. A slight difference occurred between the adoption and usage models (as outlined in Appendix 8.4.9). The ABC usage variable had AVE = 1:00, MSV=0.47, and ASV=0.36 – the same values as prior to the diagnostics. ABC usage has an r^2 smaller than AVE in terms of the discriminate validity. This is shown in Table 5.25. Table 5.13 shows more details pertaining to the discriminate validity of the other measured variables and latent constructs after diagnostics.

The correlation matrix for ABC usage after diagnostics, indicating an absence of multicollinearity, is shown in Table 5.26.

Table 5.25: Discriminate validity for the ABC usage measurement model after the diagnostics[a]

	1 ABC usage
1 ABC usage	**1.00**
2 Cost structure	0.29
3 Financial performance	0.33
4 Cost reduction	0.41
5 Service cycle time reduction	0.44
6 Service quality	0.42
7 Size	0.11
8 Cost leadership strategy	0.19
9 Differentiation strategy	0.47
10 Service diversity	0.43
11 Competition	0.47

[a] Values in bold represent AVE.

Table 5.26: The correlation matrix for the ABC usage measurement model after the diagnostics

	1 ABC usage
1 ABC usage	1.00
2 Cost structure	0.54
3 Financial performance	0.58
4 Cost reduction	0.64
5 Service cycle time reduction	0.66
6 Service quality	0.65
7 Size	0.34
8 Cost leadership strategy	-0.43
9 Differentiation strategy	0.69
10 Service diversity	0.65
11 Competition	0.68

5.4.5 Validating the CSS measurement model

5.4.5.1 Assessing the CSS measurement model

The standardised factor loading for every discreet indicator has to be ≥ 0.50. This is the first diagnostic, as conveyed in sub-section 5.4.1.1.1. Due to it having a factor loading = 0.21, the capital employed indicator of the size construct was thereby removed. Appendix 8.5.1 displays the CFA model for CSS, following a consideration of the factor loading. The regression weight after factor loading considerations can be found in Appendix 8.5.2. As shown in the appendix, the factor loadings for the number of cost pools, volume cost drivers and non-volume cost drivers are greater than 0.60.

The second diagnostic (Appendix 8.5.3) involves a check of the fitness indices. The CSS measurement model had an acceptable fit, with Chi-square $\chi^2 = 1219.71$, $\chi^2/df = 2.09$, RMSEA = 0.07, $df = 567$, CFI = 0.90, IFI = 0.90, and PNFI = 0.72.

The modification indices are then checked for the third diagnostic. The indices pertaining to the CSS model following the consideration of the factor loading are displayed in Appendix 8.5.4. Up until this phase, the CSS measurement model presents no issues. As per the section on the fifth diagnostic, issues that emerge with the reliability and validity scale can be rectified using the modification indices.

For the fourth diagnostic scale, the reliability is checked. As shown in Table 5.5, the values of the scale reliability of the latent constructs and measured variables in the ABC adoption model and those of the CSS construct are identical. Three items were used to measure the CSS construct: $\alpha = 0.82$ and CR = 0.95. The scale validity is thereafter checked. This is the fifth diagnostic, as per Appendix 8.5.5 and Table 5.6 in sub-section 5.4.1.1.5. The ABC adoption model and the CSS model had scale validity for the latent constructs and measured variables with the same values for AVE and MSV. A small degree of difference emerged between the CSS model and the ABC adoption model in terms of the ASV values. The CSS construct was deemed to be acceptable, with AVE = 0.65, MSV=0.63, and ASV=0.47.

The discriminate validity for the CSS construct – shown in Table 5.27 – demonstrates that the latent constructs and measured variables share the same discriminate validity, and these were therefore omitted (see Table 5.7). The table thus contains the discriminate validity for only the CSS construct. Whilst the measurement model for CSS model showed high acceptability in terms of the CSS construct, as outlined in sub-section 5.4.1.1.5, for three discriminate validity values, acceptability was not achieved. Cross loadings may be a key causal feature, and issue resolution necessitates more consideration of the modification indices.

As a further refinement, by examining the M.I for the CSS model (Appendix 8.5.4), **COM_1**, "The intensity of competition for the major services provided", was removed from the measurement model due to its high covariance (M.I = 4.84) with **SD_1**, "Our business unit requires different processes to design services". **SD_1** was also removed because it has high covariance (M.I = 6.08) with competition the constructs, and (M.I = 8.58) with **CT_1**, "We simplify the work methods to reduce the time associated with value-added activities", so it was decided to remove **CT_1** due to its high covariance (M.I = 7.81) with the service diversity construct. Finally, **DIFF_1**, "We seek to maintain brand identification", was removed from the measurement model due to its high covariance (M.I = 7.27) with the service quality construct.

Table 5.27: Discriminate validity for the CSS measurement model[a]

	1 CSS
1 CSS	**0.65**
2 Cost structure	0.45
3 Financial performance	0.58
4 Cost reduction	0.63
5 Service cycle time reduction	0.53
6 Service quality	0.41
7 Size	0.25
8 Cost leadership strategy	0.17
9 Differentiation strategy	0.52
10 Service diversity	0.58
11 Competition	0.53

[a] Values in bold represent AVE.

Multicollinearity is then checked – as per Table 5.28 – for the last diagnostic. Given that the latent constructs and measured variables possess equal *r* values (displayed in Table 5.8), the *r* value for the CSS construct is the only one shown. The absence of multicollinearity in the construct is highlighted in Table 5.28.

Table 5.28: The correlation matrix for the CSS measurement model

	1 CSS
1 CSS	1.00
2 Cost structure	0.67
3 Financial performance	0.76
4 Cost reduction	0.79
5 Service cycle time reduction	0.73
6 Service quality	0.64
7 Size	0.50
8 Cost leadership strategy	-0.42
9 Differentiation strategy	0.72
10 Service diversity	0.76
11 Competition	0.73

5.4.5.2 The CSS measurement model after the diagnostics

Covering all of the diagnostics, the CSS model showed acceptability. See Appendices 8.5.6 and 8.5.7 for the CSS measurement model after diagnostics and the regression weight for the CSS measurement model. A standardised factor loading above 0.50 was present, according to all of the indicators. There was an acceptable fit for the overall usage measurement model, with Chi-square $\chi^2 = 753.334$, $\chi^2/df = 1.70$, RMSEA = 0.06, $df = 442$, CFI = 0.94, IFI = 0.95, TLI or NNFI = 0.93, and PNFI = 0.73 (see Appendix 8.5.8).

Table 5.11 shows that the same construct reliability and latent construct values in the CSS measurement model after diagnostics were in the ABC adoption model. The measurement of the CSS construct was conducted using three items: α = 0.82 and CR = 0.95. The CSS model scale validity for the latent constructs and measured variables after the diagnostics possessed the same values as the ABC adoption model for the AVE and MSV values. As can be seen in Appendix 8.5.9, a small degree of difference emerged between CSS usage models and the ABC adoption model. The CSS construct showed the same values as prior to the diagnostics, i.e. AVE = 0.65, MSV=0.58, and ASV=0.39. As per Table 5.29, the CSS usage had an r^2 smaller than the AVE. More details relating to the discriminate validity of the measured variables and latent constructs after the diagnostics can be viewed in Table 5.13. As in Table 5.30, the correlation matrix for the CSS following the diagnostics shows the absence of multicollinearity.

Table 5.29: Discriminate validity for the CSS measurement model after the diagnostics[a]

	1 CSS
1 CSS	**0.65**
2 Cost structure	0.37
3 Financial performance	0.53
4 Cost reduction	0.58
5 Service cycle time reduction	0.44
6 Service quality	0.27
7 Size	0.24
8 Cost leadership strategy	0.14
9 Differentiation strategy	0.46
10 Service diversity	0.41
11 Competition	0.49
[a] Values in bold represent AVE.	

Table 5.30: The correlation matrix for the CSS measurement model after diagnostics

	1 CSS
1 CSS	1.00
2 Cost structure	0.61
3 Financial performance	0.73
4 Cost reduction	0.76
5 Service cycle time reduction	0.67
6 Service quality	0.52
7 Size	0.49
8 Cost leadership strategy	-0.37
9 Differentiation strategy	0.68
10 Service diversity	0.64
11 Competition	0.70

5.5 Conclusion

This chapter had two main objectives. The first objective was to present the findings related to the preliminary analysis (i.e. inconsistent questionnaire answers, missing data, outlier, and normality). The second objective was to assess and validate the five measurement models (i.e. the ABC adoption model, AA usage model, ACA usage model, ABC usage model, and CSS model) through the CFA diagnostics measurements, which include standardised factor loadings, goodness-of-fit-indices, modification indices, scale reliability, scale validity, and multicollinearity. The following three chapters will present the structural models, hypotheses and qualitative results for the ABC adoption model, AM usage models, and CSS model.

Chapter 6: Results and Discussion of the Structural Model for ABC adoption

6.1 Introduction

The preliminarily data analysis was discussed in the previous chapter. It is an important procedure for conducting and evaluating the measurement model after the first stage of structural equation modelling (SEM). After evaluating the measurement model and achieving acceptable model fits, the structural model will be evaluated, which is the second stage of SEM. This chapter presents the descriptive statistics for the research variables for ABC adoption model. In addition, this chapter tests the theoretical research model for activity-based costing adoption (ABC) and examines the research hypotheses, developed in chapter 3, by using the SEM structural model. Moreover, this chapter presents some supplementary interview results to address the following questions: (1) What are the interviewees' views on any unexpected results arising from the quantitative research? (2) What are the interviewees' views on any possible contingent factors that can influence ABC adoption, and any possible performance factors which ABC adoption may influence?[52] In addition, this chapter discusses the quantitative results and some supplementary interview results for the ABC adoption model.

This chapter is organised as follows. Section 6.2 presents the descriptive statistics for the research variables that will be tested using the ABC adoption structural model. Section 6.3 presents the results and discussion of the structural model for ABC adoption, which includes the discussion of the hypotheses results, and the qualitative findings. Section 6.4 provides the results of the interview analysis about any modification of the left section of the ABC adoption model and potential factors that may be related to this model. Section 6.5 provides the interview

[52] General information about the interviewees' companies is presented in sub-section 4.4.2.2 of chapter 4.

analysis of the possible performance factors which ABC adoption may influence. Finally, section 6.6 concludes this chapter.

6.2 Descriptive statistics

This section provides an initial view of the nature of the research data collected and used in the main statistical analysis. The descriptive statistics includes the mean, median standard deviation, skewness and kurtosis. This section is organised as follows: (1) descriptive statistics of ABC adoption, (2) descriptive statistics of the potential factors influencing the ABC adoption, and (3) descriptive statistics of the influence of ABC adoption on non-financial and financial performance.

6.2.1 Descriptive statistics for ABC adoption

As discussed in chapter 4, sub-section 4.4.1.5, ABC adoption and non-adoption were defined as four methods of ABC adopting/non-adopting. The current research will use only the fourth ABC adoption method. This method includes companies that adopted ABC and chose option 1 for question A_1; however, for non-ABC adoption, it includes all of the companies that have not adopted ABC and chose any option from 2 to 9 in the question. By including only the fourth ABC adoption method, the results for the three models (ABC adoption, activity management [AM] usage, and cost system sophistication [CSS]) of this research will be based on the same sample size, as the fourth construct of ABC adoption will include all usable questionnaires.

In order to address the first question of the first group ($RQ_{1/1}$), the current study found that the adoption of ABC in the UK non-manufacturing industry sample is 21.08%. By comparing this finding with other non-manufacturing research using similar definitions of ABC adoption and non-ABC adoption, Clarke and Mullins (2001) found that the adoption rate in Irish non-manufacturing companies was 19%, which is similar to the adoption level of ABC in the UK non-manufacturing industry, as seen in the current research.[53]

6.2.2 Descriptive statistics for the potential factors influencing ABC adoption

The descriptive statistics for the factors influencing the adoption of ABC are presented in Table 6.1. These factors are competition, business strategy, service diversity, cost structure, and size of the business unit. This table presents the descriptive statistics for the items for each latent construct which will be used in the structural models.

The results show that the mean score for competition in UK non-manufacturing companies is 3.15 out of 5. However, Brierley (2007) found that the mean score for competition in UK manufacturing companies was 4.34 out of 5. In Dutch manufacturing companies, Schoute (2004) found that the mean score for competition is 3.42 out of 5. By comparing the current research findings with Brierley (2007) and Schoute's (2004) findings, it can be seen that the level of competition in the UK and Dutch manufacturing companies is greater than that in UK non-manufacturing companies, although the reason for this could be that the measurement of competition in this research differs than that employed in Schoute (2004) and Brierley's (2007) research. In addition, the competition construct had acceptable values of skewness and kurtosis.

[53] For example, Clarke and Mullins (2001) defined ABC adoption as companies that have currently adopted ABC; however, non-ABC adopters included the other experience of ABC (e.g. not only companies who were currently assessing ABC, but also those who had not yet adopted ABC but might consider doing so in the near future, those who had considered but rejected ABC and those who had not considered ABC).

Table 6.1: Descriptive statistics for the potential factors influencing ABC adoption

	Mean	Median	Std. Deviation	Skewness	Kurtosis
***B*$_1$. Competition**	**3.15**	**3.13**	**0.94**	**0.27**	**-0.58**
COM_1: The intensity of competition for the major services provided	3.32	3.00	1.10	0.04	-1.07
COM_2: Our suppliers have the ability to negotiate higher prices with our business unit	3.05	3.00	1.09	0.26	-0.80
COM_3: Our customers have the ability to negotiate lower prices with our business unit	3.13	3.00	1.11	-0.08	-0.72
COM_4: The degree to which our business unit is threatened by substitute services	3.10	3.00	1.10	0.19	-0.73
***B*$_2$. Differentiation strategy**	**3.05**	**3.00**	**1.05**	**0.14**	**-0.76**
DIFF_1: We seek to maintain brand identification	3.22	3.00	1.16	-0.02	-0.91
DIFF_2: We seek to be unique in our industry and find that buyers are willing to pay a premium price for that uniqueness	2.95	3.00	1.18	0.12	-0.99
DIFF_3: We invest in technology to develop unique service designs	2.97	3.00	1.21	0.24	-0.97
***B*$_2$. Cost leadership strategy**	**2.95**	**3.00**	**0.95**	**-0.20**	**-0.98**
CL_1: We seek to be the lowest cost service provider in our industry	2.78	3.00	0.93	-0.19	-0.73
CL_2: We place considerable emphasis on reaping cost advantages from all services	3.03	3.00	1.06	-0.23	-1.05
CL_3: We invest in technology to develop low-cost service designs	3.04	3.00	1.23	-0.01	-1.15
***B*$_3$. Service diversity**	**3.01**	**2.75**	**0.88**	**0.37**	**-0.48**
SD_1: Our business unit requires different processes to design services	2.91	3.00	0.94	0.24	0.06
SD_2: Our business unit requires different processes to provide services	2.88	3.00	1.05	0.31	-0.74
SD_3: Our business unit has differences in the volume of services provided across different services	3.13	3.00	1.03	0.15	-0.79
SD_4: Our business unit has differences in the volumes of services provided across different service segments	3.15	3.00	1.04	0.02	-0.54
***C*$_1$. Cost structure:** The percentage of indirect service costs to direct and indirect costs	**24.91%**	**20.00%**	**0.1762**	**0.86**	**-0.05**
SIZE_1: Number of employees	1902.09	605.50	4,344.718	5.66	38.10
SIZE_2: Sales revenue	£431,659,338	£116,500,000	1,149,783,405	5.50	33.37
SIZE_3: Capital employed	£35,187,828	£12,815,488	113,987,191	8.42	83.23

As shown in Table 6.1, UK non-manufacturing companies tend to use a differentiation strategy slightly more than a cost leadership strategy. The mean score for the differentiation strategy is 3.05 out of 5; however, the mean score for the cost leadership strategy is 2.95 out of 5. However, Chenhall and Langfield-Smith (1998) found that the mean score for the differentiation strategy in Australian manufacturing companies was 4.01 out of 5, while the cost leadership strategy had a mean score of 2.67 out of 5.[54] The differentiation and cost leadership strategy constructs have acceptable values of skewness and kurtosis.[55]

The mean score for service diversity in UK non-manufacturing companies is 3.01 out of 5. However, this value is not comparable with other research, as most previous studies of costing systems focus on product diversity rather than service diversity. Brown et al. (2004) used a product/service diversity variable with ABC adoption in Australian manufacturing and non-manufacturing companies; however, the mean score for this product/service diversity is not disclosed in thier research. The service diversity constructs in the current research have acceptable values of skewness and kurtosis.

The mean score for the percentage of indirect costs to direct and indirect costs in UK non-manufacturing companies is 24.91%. This percentage is slightly lower than the percentage of indirect costs to direct costs for non-manufacturing companies found by Al-Omiri and Drury (2007), which was 31.9%. However, the mean current research cost structure is slightly higher than that for manufacturing companies (21.11%), as reported by (Brierley, 2011). Thus, this research confirms the empirical evidence, as reported by previous researchers, that the indirect costs in the non-manufacturing industry can be higher than those in the manufacturing industry. This is due to the high percentage of raw materials costs in manufacturing industry compared

[54] Chenhall and Langfield-Smith (1998) used a seven-point Likert scale. The mean scores were converted into a score out of 5 to be comparable with the current research.
[55] This was also discussed in sub-section 5.2.3.

to non-manufacturing industry (Drury, 2018). The cost structure variable has acceptable values of skewness and kurtosis.

Finally, in this section, Table 6.1 also presents descriptive statistics for the size of the business unit.[56] Three indicators were developed to measure the size of the business unit: (1) number of employees, (2) sales revenue, and (3) capital employed.[57] The mean score for the number of employees in UK non-manufacturing companies is 1,902 employees. For sales revenue, the mean score is £431,659,338 in UK non-manufacturing companies. This study also found that the mean score of capital employed is £35,187,828. The current research found the size of employees and sales revenue to be larger than in previous studies, as this research targets medium and large companies. For example, Brown et al. (2004) found that the mean score of employee numbers in Australian manufacturing and non-manufacturing companies is 745; and Brierley (2011) found that the mean score for sales revenue is £139,639,000. The size construct has unacceptable values of skewness and kurtosis for the raw data. In order to have acceptable skewness and kurtosis for the size items, it was decided to transform the size items by using Log N (see Appendix 7.2).

6.2.3 Descriptive statistics for the performance measures

Performance in this research refers to both non-financial and financial performance. Non-financial performance includes three constructs, namely (1) service quality, (2) service cycle time reduction and (3) cost reduction. Three indicators measured the financial performance construct and are (1) net sales, (2) return on investment (ROI), and (3) return on assets (ROA).

[56] The data presented in Table 6.1 are based on the raw data. The descriptive statistics for transformed size instruments by using Log N are presented in Appendix 7.3.

[57] This research will use only the number of employees and sales revenue as indictors of the size of the business unit; it was decided to remove capital employed as a measurement of size because it has a 0.21 factor loading which is far below the acceptance level of loading in the measurement model using CFA. More information was discussed in sub-section 5.4.1.1.1, chapter 5.

Table 6.2 presents the descriptive statistics for service quality. The analysis shows that UK non-manufacturing companies were able to attain an average improvement of service quality, with a mean score of 3.29 out of 5. Maiga and Jacobs (2008) found that US manufacturing companies tended to maintain a higher improvement in product quality (4.3 out of 5) compared to the current research findings.[58] The improvement in product/service quality in manufacturing industry is higher than that found in non-manufacturing industry. The skewness and kurtosis of the service quality items are acceptable.

The analysis shows that UK non-manufacturing companies were able to attain an average reduction in their service cycle, with a mean score of 3.08 out of 5. Maiga and Jacobs (2008) found that US manufacturing companies tended to maintain a higher improvement (decrease) in service cycle time (4.29 out of 5) compared to the current research findings. The reduction in the product/service cycle time in the non-manufacturing industry is lower than that in manufacturing industry. In addition, the skewness and kurtosis of the service cycle time reduction items are acceptable.

[58] Maiga and Jacobs (2008) used a seven-point Likert scale. The mean scores were collapsed into a score out of 5 to make them comparable with the current research.

Table 6.2: Descriptive statistics for the constructs that are assumed to be influenced by ABC adoption

	Mean	Median	Std. Deviation	Skewness	Kurtosis
***B₅*. Service quality**	**3.29**	**3.25**	**0.93**	**-0.03**	**-1.08**
SQ_1: Our business unit has the required skills and knowledge to perform services	3.40	3.00	0.95	0.05	-0.76
SQ_2: Our business unit performs services properly first time and honours its promises	3.26	3.00	1.02	0.07	-0.91
SQ_3: Our business unit aims to keep our customers informed about when services will be performed	3.25	3.00	1.07	0.02	-0.97
SQ_4: Our business unit provides easily accessible services	3.25	3.00	1.06	0.02	-0.82
SQ_5: Our business unit has convenient locations for service facilities	3.23	3.00	1.10	-0.02	-0.76
SQ_6: Our business has convenient operating hours	3.27	3.00	1.05	-0.06	-0.73
SQ_7: Our business unit's customers feel safe with their transactions with our business unit	3.35	3.00	1.08	-0.18	-0.80
SQ_8: Our business unit readily responds to customers' requests	3.32	3.00	1.13	-0.01	-0.98
***B₄*. Service cycle time reduction**	**3.08**	**2.75**	**0.93**	**0.35**	**-0.79**
CT_1: We simplify the work methods to reduce the time associated with value-added activities	3.10	3.00	0.92	-0.08	-0.11
CT_2: We simplify the work methods to reduce the time associated with non-value-added activities	3.08	3.00	1.06	0.26	-0.91
CT_3: We invest in new technology to reduce the time associated with value-added activities	3.06	3.00	1.11	0.15	-0.89
CT_4: We invest in new technology to reduce the time associated with non-value-added activities	3.09	3.00	1.13	0.19	-0.92
***B₆*. Cost reduction**	**2.70**	**2.50**	**1.00**	**0.34**	**-0.49**
CR_1: Direct service costs	2.75	3.00	0.99	0.12	-0.22
CR_2: Indirect service costs	2.66	2.00	1.18	0.53	-0.62
***B₇*. Financial performance**	**2.90**	**2.67**	**0.95**	**0.42**	**-0.62**
PERF_1: Net sales (operating revenue earned by our business unit for rendering our services)	3.04	3.00	0.94	0.27	-0.20
PERF_2: Return on investment (net profit from investments divided by the cost of the investment)	2.84	3.00	1.10	0.32	-0.61
PERF_3: Return on assets (net profit divided by total assets)	2.80	3.00	1.11	0.42	-0.59

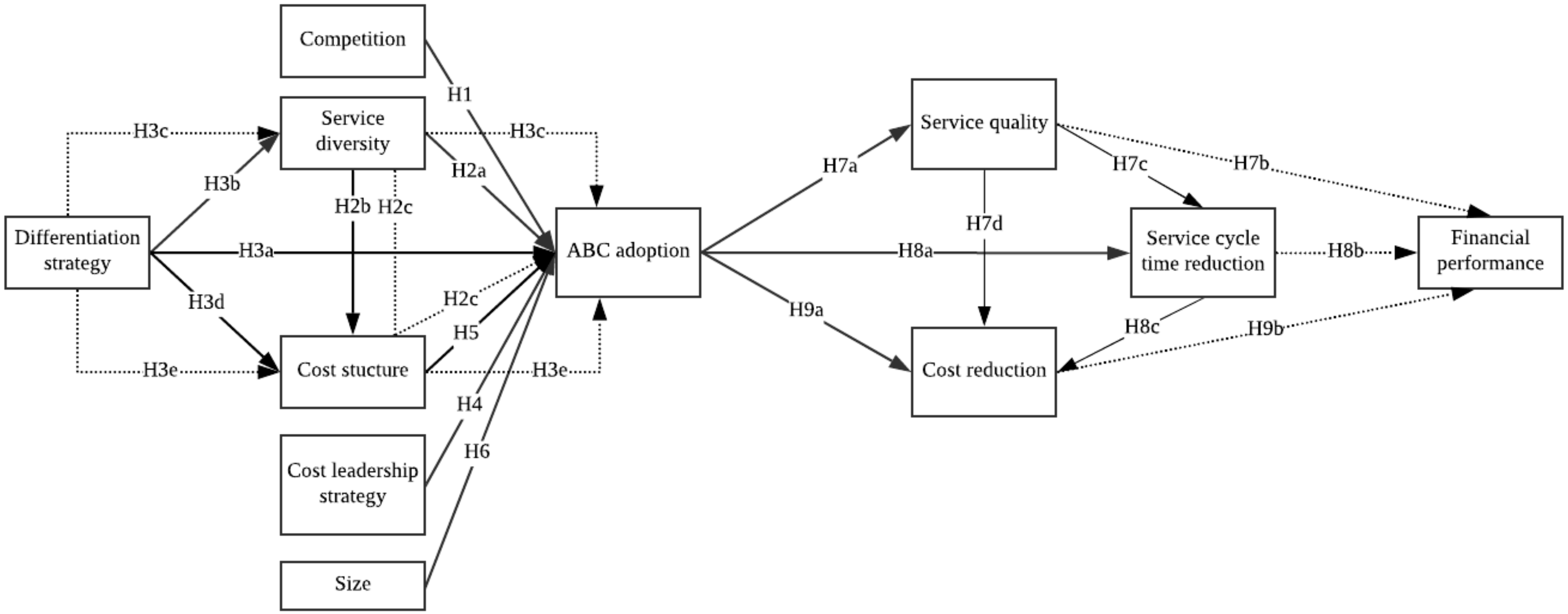
The analysis shows that UK non-manufacturing companies were able to obtain an average reduction in costs, with a mean score of 2.70 out of 5. Maiga and Jacobs (2008) found that US manufacturing companies tended to maintain a lower improvement (decrease) in costs (4 out of 5) compared to the current research findings. Furthermore, the skewness and kurtosis of the cost reduction items are acceptable.

The analysis shows that UK non-manufacturing companies were able to obtain an average improvement in financial performance, with a mean score of 2.90 out of 5. Maiga and Jacobs (2008) found that US manufacturing companies tended to maintain a higher financial performance (3.91 out of 5) compared to the current research findings. The improvement in financial performance in the manufacturing industry is higher than that in the non-manufacturing industry, possibly due to the different measures used in the current research compared to Maiga and Jacobs' (2008) research. Maiga and Jacobs (2008) used three indicators to measure financial performance: (1) market share, (2) return on sales (ROS) and (3) turnover on assets, which are different from the current research's indicators. In addition, the skewness and kurtosis of the financial performance items are acceptable

6.3 The results and discussion for the ABC adoption model

As discussed in chapter 5, sub-section 5.4.1.2, the measurement models for ABC adoption were acceptable in terms of meeting all of the criteria (i.e. model fit, factor loading, reliability, validity, and multicollinearity of the research's latent constructs). The next step is to test the structural model for ABC adoption, which includes two sets of hypotheses. The first set of hypotheses (H_1-H_6) relates to the first group of research questions, which focuses on the influence of contingent factors on the adoption of ABC ($RQ_{1/2}$ - $RQ_{1/5}$). These hypotheses represent the direct and mediation relationships, which were discussed in chapter 3, section 3.7 and are summarised below in Figure 6.1. The hypotheses that present the direct relationships are H_1, H_{2a}, H_{3a}, H_4, H_5 and H_6; and the mediation hypotheses are H_{2c}, H_{3c} and H_{3e}. The second set of hypotheses (H_{7a}-H_{9b}) relates to the second group of research questions which focus on the influence of ABC adoption on outcomes, including non-financial and financial performance

($RQ_{2/1} - RQ_{2/4}$). These hypotheses represent direct and mediation relationships. The hypotheses that present the direct relationships are H_{7a}, H_{8a} and H_{9a}; and the mediation hypotheses are H_{7b}, H_{8b} and H_{9b}.



The solid lines indicate a direct relationship.
The dotted lines indicate a mediation relationship.

Figure 6.1: The research hypotheses for the ABC adoption model

Figure 6.2 presents the structural model for ABC adoption. This model has unsatisfactory fitness indices, especially for SRMR, which is 0.16, which is higher than the accepted value (see Table 6.3). In addition, the CFI, IFI, and RMSEA have acceptable values in the low range. In order to improve the model fit, it was decided to add a direct relationship between differentiation strategy and service quality. This relationship is supported by the theory (Grant, 2016; Prajogo and Sohal, 2006), and indicated by the modification indices. One element of the differentiation strategy is quality. "Differentiation strategy's emphasis on branding, advertising, design, service, quality, and new product development. Marketing abilities, product engineering skills, cross-functional coordination, creativity, research capability, incentive linked to qualitative performance target" (Grant, 2016, p. 201).[59] Figure 6.3 shows the ABC adoption model after the new hypothesis (the differentiation strategy is related positively to service quality). The overall fit of the ABC adoption structural model is acceptable, as shown in Table 6.4, with Chi-square $\chi^2 = 806.718.109$, $\chi^2/\mathrm{df} = 1.96$, RMSEA = 0.07, $df = 411$, SRMR = 0.08, CFI = 0.92, IFI = 0.92, TLI or NNFI = 0.91, and PNFI = 0.76. This section follows with two sub-sections, which are discussed below: (1) hypotheses related to the factors that influence the adoption of ABC, and (2) hypotheses related to the influence of ABC adoption on non-financial and financial performance.

Table 6.3: Fitness indices for the ABC adoption structural model

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 927.203, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 2.25$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.08	Satisfied
	df	> 0	$df = 412$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.16	Not satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.90	Satisfied
	IFI	≥ 0.90	IFI = 0.90	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.89	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.74	Satisfied

[59] The differentiation strategy in the current research was measured by three items. The first item captured the brand identification, the second the uniqueness of the services, and the third the use of technology to develop services.

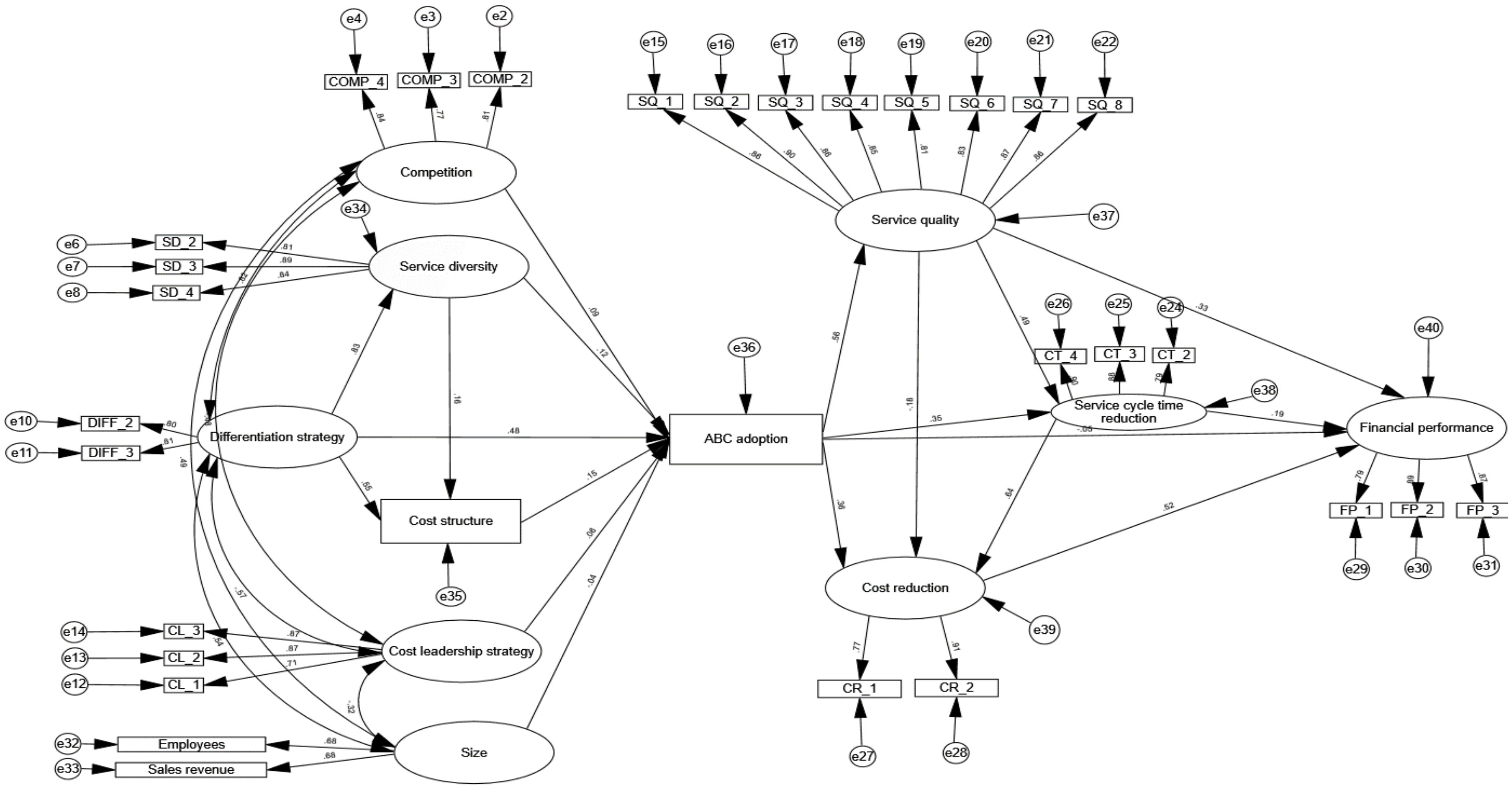


Figure 6.2: The ABC adoption structural model

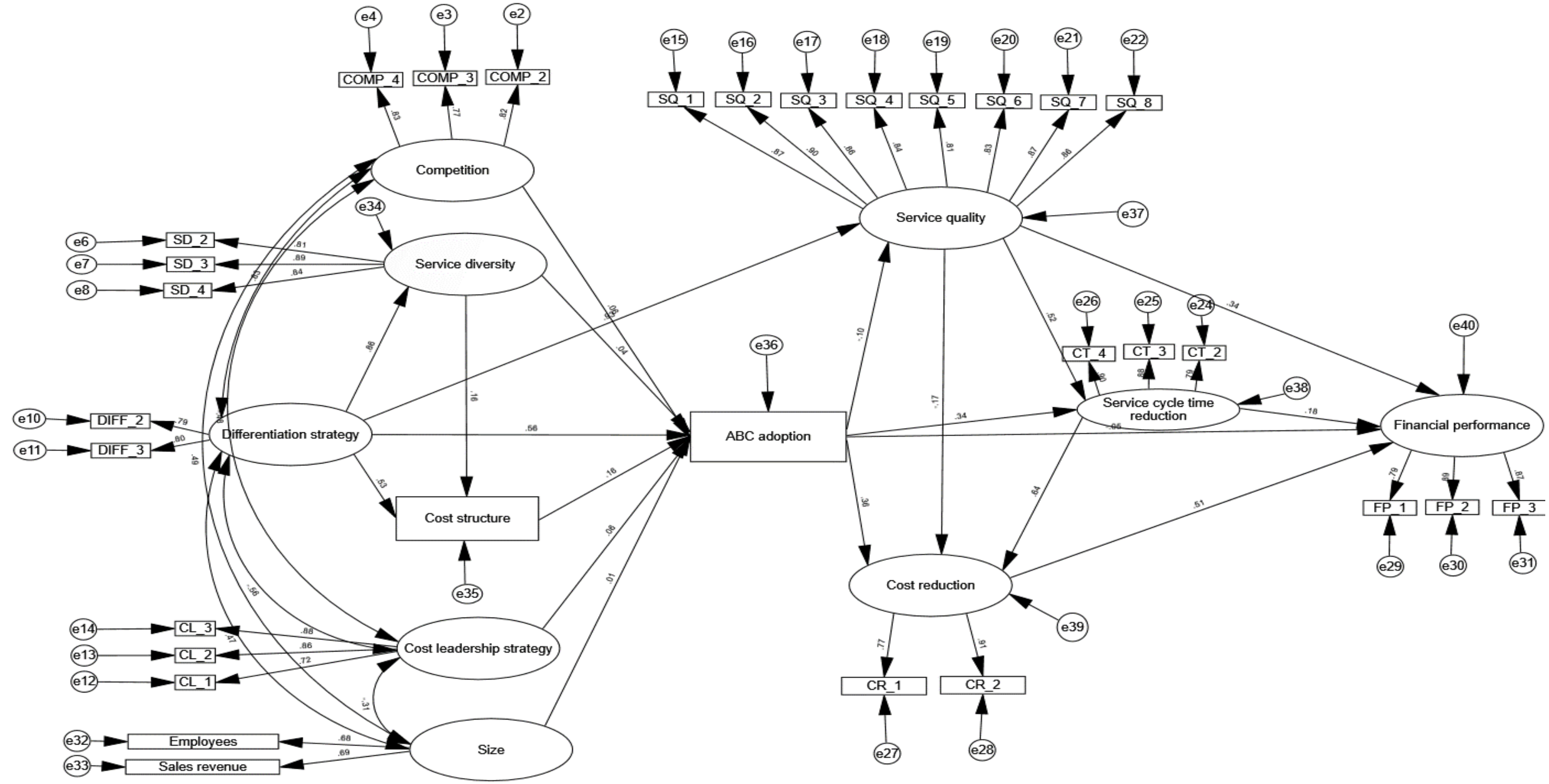


Figure 6.3: The ABC adoption structural model post-modification

Table 6.4: Fitness indices for the ABC adoption structural model post-modification

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 806.718, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 1.96$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.07	Satisfied
	df	> 0	$df = 411$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.08	Satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.92	Satisfied
	IFI	≥ 0.90	IFI = 0.92	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.91	Satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.76	Satisfied

6.3.1 First research objective: to examine the extent to which a set of contingent factors influence ABC adoption

6.3.1.1 Competition and ABC adoption

The first hypothesis of the ABC adoption model (H_1) predicts a direct positive impact of competition on ABC adoption. The result of the current research found no significant relationship between competition and ABC adoption, as reported in Table 6.5. The research findings are in line with some of previous ABC adoption studies, which reported no relationship between competition and ABC adoption (Aljabr, 2020; Bjørnenak, 1997; Brierley, 2011; Cohen et al., 2005; Rankin, 2020; Schoute, 2009). It was argued that the non-significant relationship between competition and ABC adaption reported in the previous literature was possibly due to the measurement of competition (Holm and Ax, 2020).

In addition, the field study helped to shed more light on why competition may still have no impact on ABC adoption. For example, one interviewee believed that the level of competition is unrelated to ABC adoption, for one reason. The interviewee at company A believed that competition is an external factor and is marketplace-driven; therefore, the company's experience of ABC is unaffected by external factors, such as competition. This argument is in line with a recent study by Aljabr (2020) and Rankin (2020), who proposed that a possible reason why no relationship exists between competition and ABC adoption is because the companies that have responded may be price-takers rather than price-makers. On the other hand, the interviewees from Companies B and C believed that the level of competition can affect ABC adoption.

Given the above explanation, there are three possible reasons for the lack of a relationship between competition and ABC adoption. The first potential reason, as the interviewee mentioned, is that competition is an external factor which has no direct impact on ABC adoption. The second is that the measurement of ABC adoption is inadequate. Because the current research used ABC adoption construct 4 (i.e. ABC adoption includes companies that adopted ABC and chose option 1; however, for non-ABC adoption, it included companies that do not adopt ABC and selected several experiences of ABC from option 2 to option 9 on the questionnaire). However, several experiences may not be reflected in the entire non-ABC adoption process (Alcouffe at al., 2019; Brierley, 2011). It would be better to remove these companies from the analysis and instead use the three constructs suggested by Brierley (2011).[60] Thus, it is possible that competition could have a direct and significant relationship with ABC adoption construct 1 (ABC adoption includes companies that adopted ABC and chose option 1; however, for non-ABC adoption, it excludes companies that chose option 8), ABC adoption construct 2 (ABC adoption includes companies that adopted ABC and chose option 1; however, for non-ABC adoption, it excludes companies that chose options 2 and 8), or ABC adoption construct 3 (ABC adoption includes companies that adopted ABC and chose option 1; however, for non-ABC adoption, it excludes companies that chose options 5 and 8). The third possible reason is that the measurement of competition is inadequate and limited, as

[60] Additional discussion of the ABC adoption constructs can be found in chapter 2, sub-section 2.2.1.1. The reason for not using the three constructs of ABC adoption in the current research is that the sample will be lower than the sample in the AM usage model and CSS model. In addition, using the first three constructs of ABC adoption will require different statically technique than which used in the current research as the sample size will be lower than 200.

it may need to be broadened by including more dimensions of the level of competition (Aljabr, 2020). This means that it becomes necessary to extend the measurement of competition to include all of the dimensions of Porter's forces. As different types of competition could have different influences on the use of management control (Khandwalla, 1972), it is necessary to examine whether or not the different types of competition have a direct impact on ABC adoption (Holm and Ax, 2020).

Table 6.5: Summary of the results for the ABC adoption model

Exogenous variables	Endogenous variables													
	ABC adoption		Cost structure		Service diversity		Service quality		Service cycle time reduction		Cost reduction		Financial performance	
	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value
Competition	0.06	0.65												
Service diversity	0.04	0.79	0.16	0.27										
Cost structure	0.16	0.03												
Differentiation strategy	0.56	0.03	0.53	0.00*	0.86	0.00*	0.93	0.00*						
Cost leadership strategy	0.06	0.37												
Size	0.01	0.90												
ABC adoption							-0.10	0.22	0.34	0.00*	0.36	0.00*	-0.05	0.50
Service quality									0.52	0.00*	-0.17	0.04	0.34	0.00*
Service cycle time reduction											0.64	0.00*	0.18	0.11
Cost reduction													0.51	0.00*

* *p* value < 0.001 (two-tailed).

[a] Standardised coefficient (β).

6.3.1.2 Service diversity and ABC adoption

High service diversity was hypothesised in H_{2a} as positively increasing the adoption of ABC. Table 6.5 suggests, however, that service diversity has no association with ABC adoption. As previously acknowledged, there is no literature examining the relationship between service diversity and ABC adoption; however, some literature did focus on manufacturing and non-manufacturing companies and obtained inconsistent findings (Brown et al., 2004; Cagwin and Bouwman, 2002; Malmi, 1999). The reason for this inconsistency could be the use of both industries in their sample. Some of the questions were relevant only to the manufacturing industry and not to the non-manufacturing industry (Alcouffe et al., 2019), which means that there is no prior literature to consult. The results of this study, however, do not differ from Brown et al. (2004)'s findings, who examined both industries.

In addition, the field interviews show that two interviewees from Companies A and B concur with the statistical results, since they believed that no relationship exists between service diversity and ABC adoption. For example, the financial director from Company B believed that such a relationship between diversity and ABC adoption is more likely to exist in manufacturing companies than in non-manufacturing companies. The reason for this is that, if manufacturing companies tend to diversify their products, it will be easier for them to adopt ABC and identify activities compared to non-manufacturing companies. The diversity of products can be larger than the diversity of services, which can result in the manufacturing industry adopting ABC to help them allocate the overhead costs. For example, most of the ABC adoption studies in manufacturing industry found a direct and significant relationship between product diversity and ABC adoption (Jusoh and Miryazdi, 2015; Khalid, 2005; Schoute, 2004). This argument is consistent with recent research by Alcouffe et al. (2019), based on a meta-analysis of 24 studies, which reported that the relationship between diversity and ABC adoption may occur in manufacturing as opposed to service companies. Alcouffe et al. (2019) noted that, in the case of manufacturing companies specifically, the majority of the costs tend to be associated with technological and transaction-related driver costs, all of which can be recorded on an ABC system, without any significant difficulty. However, Alcouffe et al. (2019) have highlighted that, in contrast, non-manufacturing companies differ, since their costs and time allocated to support activity cost pools represent a sizeable percentage of their overall costs. Despite the advancements made with the ABC system, there remain challenges associated with recording the overhead costs in a systematic manner. According to Alcouffe et al. (2019), this significantly diminishes the potential benefits of using this system within service industry.

Given the paucity of previous studies that confirm the hypothesis in question, alongside the results derived from both the quantitative research and some supplementary interviews, it can be argued that they may be unrelated and that there is an argument for refining the theory.

6.3.1.3 Cost structure and ABC adoption

The cost structure, when measured by a high proportion of indirect costs, was hypothesised in H_5 as positively increasing the adoption of ABC. The results of the current study found a significant relationship between cost structure and ABC adoption ($\beta = 0.16$, $p \leq 0.05$), as presented in Table 6.5. The findings from this research are in line with the ABC adoption studies that focus on manufacturing industry, which reported a significant, direct relationship between cost structure and ABC adoption (Bjørnenak, 1997; Jusoh and Miryazdi, 2015; Krumwiede, 1998). The findings point to the possibility that business units increase their adoption of ABC because of large non-manufacturing overheads. This is consistent with the argument that business units, which have higher indirect than direct costs, tend to adopt ABC to avoid significantly distorted costs (Cagwin and Bouwman, 2002; Cooper and Kaplan, 1992).

The results of the current study, however, conflict with most of the ABC adoption studies, which failed to find a significant relationship between cost structure and ABC adoption (Aljabr, 2020; Brierley, 2011; Brown et al., 2004; Cohen et al., 2005; Khalid, 2005; Malmi, 1999; Van Nguyen and Brooks, 1997). It is possible that some of these previous ABC adoption studies could not find a relationship because they focused on heterogeneous sectors, including both manufacturing and non-manufacturing companies (Brown et al., 2004; Cohen et al., 2005; Malmi, 1999). Thus, the focus on different industries might have led to different findings, as the overhead costs for non-manufacturing companies are generally higher than those for manufacturing companies (Drury, 2018).

Moreover, all of the interviewees believed that increases in indirect costs could increase the adoption of ABC. The most frequently mentioned reason was that, if companies have high indirect costs, ABC could help them to identify the activities associated with each service provided, so that the indirect costs could be identified for each service provided. ABC accurately captures the cost of services and avoids cross-subsidisation between services (Al-Omiri and Drury, 2007; Drury and Tayles, 2005; Ismail and Mahmoud, 2012). The following are examples where the interviewees agreed with the statistical result on the direct relationship between the high proportion of indirect costs and ABC adoption:

> I think that is because, very much, if you have a fixed cost in place, then to have an activity and understand how you can relate that back to individual products or services is very important because it then gives you the true profitability, and what actually drives the profitability and the success of the business. (Company A)

> I would expect that one to be a strong relationship, because it is important for them to be able to understand what is happening with that cost base, isn't? It is a direct result of their particular cost profile, isn't it? So I thought that was what it was all about, trying to apply your overheads to your activity. (Company B)

> Very specific, very product- [service-]driven, so yeah, that therefore is going to directly affect it. I am guessing it is just a better costing method for that, to support that process. (Company C)

6.3.1.4 Service diversity, cost structure and ABC adoption

The relationships between service diversity, cost structure and ABC adoption have been framed to investigate the direct effect of service diversity on cost structure and the indirect relationship between service diversity and ABC adoption through the mediation role of cost structure. As stated in H_{2b}, it was expected that service diversity would be associated with cost structure. The varying volumes required in different services provided across the service segment can increase the costs. However, the results in Table 6.5 reveal that service diversity is not associated with cost structure.

This finding is exploratory and the possible reasons for not finding a relationship between the two variables is that the measurement of service diversity used in the current research is inadequate to capture the various elements of service diversity.

Regarding the indirect effect of hypothesis H_{2c}, there is no mediation role of cost structure between service diversity and ABC adoption (see Table 6.6).

6.3.1.5 Business strategy and ABC adoption

The differentiation strategy was hypothesised in H_{3a} as positively increasing the adoption of ABC. The results suggest that differentiation strategy has a significant and positive association with ABC adoption ($\beta = 0.56$, $p \leq 0.05$), as reported in Table 6.5. The findings of this study are in line with some ABC adoption studies, which reported a significant and direct relationship between differentiation strategy and ABC adoption (Hadid, 2019; Jusoh and Miryazdi, 2015; Schoute, 2004). ABC helps to manage the cost levels and increases a company's understanding of value-added activities that enhance the differentiation of its services.

In addition, all of the interviewees agreed that, when companies use differentiation strategy, they provide unique services that are different from those of their competitors, which leads these companies to be unique in terms of pricing these services. The interviewees illustrated this by saying:

> I think, in terms of differentiation strategy…if you are getting your costing more accurate, and your profitability increases, which will improve your financial performance, then I think that is definitely a positive of activity-based costing. I think that one of the biggest things is doing something different from what your competitors are doing, so that is an important element of having a differentiation strategy, because, obviously, if you are doing something better than your competitors, then it is going to improve your whole performance. (Company A)

> Because of its uniqueness, I am guessing then, so it is a very specific product [service], which lends itself to a very specific costing route. I imagine that is preferential in that decision. I imagine they appreciate the power of their unique product [service] and therefore feel that it is an appropriate way to cost. It is on a unique basis, so activity-based, I would imagine. (Company C)

On the other hand, the cost leadership strategy was hypothesised in H_4 as being negatively associated with the adoption of ABC. The findings suggest that the cost leadership strategy has no association with ABC adoption, as reported in Table 6.5. The current research findings are in line with some ABC adoption studies, which reported no relationship between business strategy and ABC adoption (Elhamma and Fei, 2013; Malmi, 1999). The field study helped to shed more light on why cost leadership strategy may still have no impact on ABC adoption. Two interviews from Company A and C believed that the cost leadership strategy is not related to ABC adoption for one reason. When companies use a cost leadership strategy, they understand their costs already. Thus, ABC would not add any value. For example, the financial director expressed his thoughts by saying:

> I think, from our perspective, the business has a good understanding of its costs already, so I would say…putting in an activity-based costing adoption probably would not add as much value to the business as you would if you have not got good costing methods in place…It is probably difficult to understand how an activity-based costing adoption would give you something that would be significantly better than you have got already. (Company A)

On the other hand, one interviewee form Company B argued that a cost leadership strategy is more likely to increase the adoption of ABC. The reason provided by the interviewee was that the type of companies which use the cost leadership strategy are more likely to adopt ABC because ABC may help them to structure their costs. Companies using cost leadership strategy can benefit from ABC adoption to identify and analyse different activities consumed by services, to take action to reduce the non-value added and/or redundant activities to decrease the cost of services and, therefore, increase the financial performance. This is consistent with

Drury and Tayles (2005), who argue that the complexity of costing systems such as ABC might be critical for companies that have applied cost leadership and differentiation strategies. The interviewee said:

> [I]t sounds like it is the most fundamental thing for them strategically. I think, therefore, it is the primary focus, isn't it? So I think it would just enable them to understand where their leadership is with the cost, relatively speaking … .I would have thought it was that one that would have meant they were more likely to do it than the differentiation … .I would have thought, with the costs leadership, because that is what we are focused on, and that naturally would lead them to shine a light on the structure of their costings, so I cannot really connect it to that one [the differentiation strategy] so much, but I can connect it to that one [the cost leadership strategy]. (Company B)

6.3.1.6 Differentiation strategy, service diversity and ABC adoption

The relationships between differentiation strategy, service diversity and ABC adoption have been framed to investigate the direct effect of differentiation strategy on service diversity and the indirect relationship between differentiation strategy and ABC adoption through the mediation role of service diversity. As stated in H_{3b}, it was expected that differentiation strategy would be associated with service diversity. The results in Table 6.5 reveal that differentiation strategy is positively associated with service diversity ($\beta = 0.86$, $p \leq 0.001$). Porter's (1980) theory states that companies that follow this type of strategy tend to have high product diversity and low-volume production.

Regarding the indirect effect, H_{3c} specifies that service diversity will positively mediate the relationship between differentiation strategy and ABC adoption. The results of the mediation analysis are reported in Table 6.6. As shown in the table, service diversity does not mediate the relationship between differentiation strategy and ABC adoption.

6.3.1.7 Differentiation strategy, cost structure and ABC adoption

The relationships between differentiation strategy, cost structure and ABC adoption have been framed to investigate the direct effect of differentiation strategy on cost structure and the indirect relationship between differentiation strategy and ABC adoption through the mediation role of cost structure. As stated in H_{3d}, it was expected that differentiation strategy would be positively associated with the cost structure. The results in Table 6.5 reveal that differentiation strategy is positively associated with cost structure (β = 0.53, $p \leq 0.001$). According to Shank (1989), companies that apply differentiation strategy may rely on new product/services innovation, research and development expenditure, as well as the proper analyses of marketing costs. Product innovation can increase the cost structure and produce more cost allocation problems. Consequently, ABC adoption provides more accurate service costs and allows for better activity management (Frey and Gordon, 1999).

Regarding the indirect effect, H_{3e} specifies that the cost structure will positively mediate the relationship between differentiation strategy and ABC adoption. The results of the mediation analysis are reported in Table 6.6. As shown in the table, the cost structure mediates the relationship between differentiation strategy and ABC adoption (β = 0.04, $p \leq 0.05$), and the indirect effect did not include zero between the lower and upper levels of the 95% confidence interval. Consequently, the mediation role of cost structure between differentiation strategy and ABC adoption is partial, as there is a positive direct association between differentiation and ABC adoption. That is to say that, if the cost structure is removed, a significant relationship between differentiation strategy and ABC adoption still stands.

6.3.1.8 Differentiation strategy and service quality in the ABC adoption model

The relationship between differentiation strategy and service quality was expected to be positive. This relationship was not hypothesised originally, but the path between differentiation strategy and service quality was added to the ABC adoption structural model in order to improve the model fit. As shown in Table 6.5, there is a positive association between differentiation strategy and service quality (β = 0.93, $p \leq 0.001$). The current research findings are supported by the theory that differentiation strategy can improve service quality (Grant, 2016; Prajogo and Sohal, 2006).

In addition, the views expressed during the field interviews support the applicability of differentiation strategy to improve service quality. One interviewee believed that this relationship was due to the fact that, when companies use differentiation strategies, they provide a service which is different to those provided by their competitors. For example, the services will be delivered to the customer on time. The financial director stated that:

> In our business, for example, selling to consumers, end consumers, if we can sell them a product [service] that is different and also a service that gets them a good, safe, next day delivery, or something like that, which our competitors cannot do, because they have not got, say, the stock levels, then that improves the whole service quality. (Company A)

Based on the field interview evidence and prior literature, it is argued that differentiation strategy can directly influence the improvement of service quality.

6.3.1.9 Size of the business unit and ABC adoption

As indicated in H_6, organisational size was expected to be positively related to the adoption of ABC. The findings of the analysis show that no significant relationship exists between size and ABC adoption, as reported in Table 6.5. This finding is consistent with the research of Cohen et al. (2005) and Rankin (2020), that empirically showed that the size of the organisation, as measured by sales revenue and the number of employees, did not influence ABC adoption. The results of the current study, however, conflict with other ABC adoption studies, which find a significant relationship between company size and ABC adoption (Brierley, 2011; Malmi, 1999; Van Nguyen and Brooks, 1997).

In addition, it was expressed during the field interviews that the size of the business unit does not impact on the adoption of ABC. All of the interviewees agreed that the size of the business units has no influence on ABC adoption, especially when the size is measured by the number of employees or sales revenue, as these two factors do not affect a company's decision about whether to adopt ABC or not. On the other hand, a higher level of complexity of the services provided could increase the adoption of ABC (the complexity associated with various services will be discussed later, in chapter 8, sub-section 8.3.1.8), especially among companies that do perform complex services/products. One interviewee stated:

> I would say it probably depends on the complexity of the business. If it is not a very complex business, then the size probably does not matter. (Company A)

In addition, the management accountant in Company C highlighted that these are size-related measures, and raised the question of whether other measures would also be appropriate, such as the size of the financial resources of the business. (These will be discussed further in this chapter, section 6.4 and also later, in chapter 8, section 8.4). She stated:

> It is just reliant on a product [service], is not it? It is not related to the number of people. You can slice it and dice it however you feel. Company size is not effective. (Company C)

Based on the quantitative and qualitative results, there was no relationship between company size and ABC adoption. As the interviewee mentioned, the number of employees and sales revenue is not an applicable measurement and will not affect a company's decision regarding ABC adoption.

6.3.2 Second research objective: to examine the indirect influence of ABC adoption on financial performance through non-financial performance factors

6.3.2.1 ABC adoption, service quality and financial performance

The current study anticipated a positive direct relationship between ABC adoption and service quality (H_{7a}). The results in Table 6.5 reveal that ABC adoption has no association with service quality. The results of this study conflict with those of Maiga and Jacobs (2008), who found a positive and direct relationship between the extent of ABC use and product quality.

There are two possible explanations for the insignificant effect of ABC adoption on service quality reported by the current study. Firstly, the influence of differentiation strategy on service quality can dilute the effect of ABC adoption on service quality,[61] as the standardised coefficient between differentiation strategy and service quality is high ($\beta = 0.93$, $p \leq 0.001$). The hypotheses linking differentiation strategy and service quality was not proposed in the original ABC adoption model but was added in order to improve the model fit (as discussed in sub-section 6.3.1).

Secondly, the companies that participated in the current research may have adopted ABC to focus on other areas, such as reducing costs and the service cycle time, which consequently means that ABC adoption is not related to improving service quality.

In addition, the field interviews exposed views that support the non-significant relationship between ABC adoption and service quality. All of the interviewees believed that ABC adoption is not linked to service quality, as service quality is driven by the marketplace and what the market expects them to do. Furthermore, service quality is affected by the business unit's strategy, not its costing systems. The following comments were made:

> I suspect it is linked with the fact that quality is driven more by the standards of a business rather than the activities it undertakes … and the marketplace. If you are selling into a market, then the service quality you are providing is not determined by the activities that you do. It is more to do with what the market expects you to do. (Company A)
>
> [ABC adoption] is not going to have a direct correlation with service quality, I wouldn't have thought. Because your service quality is based on your business strategy, isn't it? … I think service quality comes out of your strategies rather than directly out … of your costing. (Company C)

[61] There is a significant and direct relationship between ABC adoption and service quality, excluding the differentiation strategy ($\beta = 0.57$, $p \leq 0.001$).

Based on the above discussion about the non-significant effect of ABC adoption and service quality, it appears that the companies surveyed in the current research may have improved their service quality because of the influence of their business strategies rather than ABC adoption.

Table 6.5 also shows that service quality is positively and significantly associated with improved business financial performance ($\beta = 0.34$, $p \leq 0.001$). Prior research also reported that product/service quality has a direct and significant relationship with financial performance (Lakhal and Pasin, 2008; Maiga and Jacobs, 2008; Nelson et al., 1992; Rust et al., 1995). Improving service quality positively affects financial performance by increasing the customer satisfaction and retention rates, raising revenue and increasing the market share, which lead to increased financial performance (Rust et al., 1995).

In addition, the field interviewees expressed views in support of the applicability of service quality for improving financial performance. The most frequently mentioned reason for this impact was that, if a company improves its service quality, the customers will be satisfied, leading them to buy more, which then increases the financial performance of the company. A financial director expressed his thoughts as follows:

> I think that customers in particular will look at your service levels, and if you provide a good service, they are going to come back and buy from you, and that will improve your profitability. (Company A)

The statistical results also confirm that ABC adoption alone did not have any significant direct effect on financial performance, which is in line with previous studies that did not find any direct link between ABC adoption and financial performance (Cagwin and Bouwman, 2002; Ittner et al., 2002; Maiga and Jacobs, 2007). One interviewee expected that ABC influenced the improvement of financial performance and provided a possible reason for this, which was the lack of a relationship between ABC adoption and financial performance, leading to limited knowledge about using ABC. Some companies analyse costs without implementing corrective actions, which will not improve financial performance. The interviewee said:

> There is probably more to [do with] businesses than just activity-based costing. I think you can end up, if you are not careful with activity-based costing, becoming too analytical and not enough action …. You can analyse it out, but unless somebody is actually implementing the actions, or the analytical information is actually actioned by somebody, then it will not improve the financial performance. (Company A).

Regarding the findings from the statistics results and fieldwork, it may be that there is no relationship between ABC adoption and financial performance for two possible reasons: firstly, the data arising from the adoption of ABC is not being used in an appropriate way, which leads to no influence being observed regarding financial performance; secondly, companies that adopt ABC will be more likely to benefit from non-financial performance factors, such as reduced costs and service cycle time, which will, ultimately and indirectly, improve their financial performance (Maiga and Jacobs, 2007).

Regarding the indirect effect, H_{7b} specifies that service quality will positively mediate the relationship between ABC adoption and financial performance. The results of the mediation analysis are reported in Table 6.6. As shown in the table, service quality does not mediate the relationship between ABC adoption and financial performance because there is no effect of ABC adoption on service quality, as discussed above.

6.3.2.2 Service quality and service cycle time reduction in the ABC adoption model

As indicated in H_{7c}, service quality was expected to be positively related to service cycle time reduction. The findings of the analysis show that a positive significant relationship exists between service quality and service cycle time reduction ($\beta = 0.52$, $p \leq 0.001$), as reported in Table 6.5. The current research results are in line with previous research that found a significant, direct relationship between product quality and product cycle time reduction (Maiga and Jacobs, 2007, 2008). Nandakumar et al. (1993) argued that improving product quality could reduce the cycle time, as high-quality products have fewer defects and a reduced need for repairs or reworking, while low-quality products have defects, which lead to delays in processing and delivery.

This argument was also supported by the field study. One interviewee agreed that improved service quality can lead to a reduced service cycle time. The financial director commented:

> Service quality and service cycle time reduction, I think can be related…because you can give good quality, and part of that quality can be a service cycle time reduction. (Company A)

6.3.2.3 Service quality and cost reduction in the ABC adoption model

Service quality was hypothesised in H_{7d} as having a negative relationship with cost reduction. The findings point to the fact that service quality has a negative association with cost reduction (β = -0.17, $p \leq 0.05$), as reported in Table 6.5. The results of this study conflict with other research that found a positive relationship between improved product quality and cost reduction (Maiga and Jacobs, 2007, 2008). A possible reason for the different results is that the current research focuses on intangible products (services), measuring the quality of which can be challenging (Schonberger, 1980). In addition, reducing the costs for intangible products can be challenging as well, as their quality depends on a qualified service provider (Schonberger, 1980). On the other hand, Maiga and Jacobs (2007, 2008) found a positive relationship between product quality and cost reduction, as increasing the quality of products will save the company having to engage in reworks or repairs, which then leads to a reduction in costs.

6.3.2.4 ABC adoption, service cycle time reduction and financial performance

The current study anticipated a positive and direct relationship between ABC adoption and service cycle time reduction (H_{8a}). The results in Table 6.5 reveal that ABC adoption was positively associated with service cycle time reduction (β = 0.34, $p \leq 0.001$). The current findings are in line with previous research in manufacturing industry, as it found a direct link between ABC adoption and a reduced product cycle time (Fei and Isa, 2010; Ittner et al., 2002). The adoption of ABC can help companies to remove the activities that do not add value to the services by simplifying the work methods and investing in new technology to reduce the time associated with value and non-value-added activities.

In addition, the field interviews provided views that support the applicability of ABC adoption for reducing the service cycle time. All of the interviewees agreed that the reduction in the service cycle time is the main variable that companies can control when adopting ABC, meaning that ABC can help companies to understand their costs and the time required to produce each service. The following are examples where the interviewees agreed with the statistical findings:

> I think you get a truer understanding of your cost base, and therefore you can actually allocate time and activities back to each individual product [service], so therefore you can improve that cycle by knowing how long it should take. (Company A)
>
> [The service cycle time reduction] is a specific variable that can be controlled, so you are going to be able to monitor that through an ABC [system]. (Company C)

Table 6.5 also shows that the service cycle time reduction has no association with improved business financial performance. The current research findings differ from other studies that found a significant relationship between service cycle time reduction and financial performance (Maiga and Jacobs, 2008). However, the interviewees were surprised by the findings, and unable to furnish possible reasons for this insignificant relationship. Instead, they described how a reduced service cycle time could improve financial performance. They explained that a reduced service cycle time led to reduced costs, which led to improved financial performance.[62] In addition, the measurement of the service cycle time reduction used in the current research can be inadequate or difficult for the participants to understand. Based on the discussion with the interviewees, their understanding about the service cycle time reduction is that it refers to

[62] This argument also will be discussed in subsection 6.3.2.5.

the time taken to deliver the service to customers. Thus, this imply a need to amend the measure use. The following are examples of where the interviewees disagreed with the statistical results:

> I am slightly surprised at that, because I thought that, if you can reduce your service cycle time, you will become far more efficient in things like warehousing costs and things like that, because you are turning over stock much more … .As a business here, if we have a stock of goods, and can deliver it to our customers very quickly, they are more likely to then buy from us again, and also it saves us costs because we then have fewer goods in the warehouse and ... the turnover of our goods is quicker, which reduces our warehousing cost per unit. (Company A)

> I am surprised. I would have thought there would be. Because it is a variable overhead, so I am guessing it depends how you are assigning your costs but, yes, I would have thought machine time reduction, reduce your overheads and therefore improve your financial performance. (Company C)

On the other hand, the financial director in company A provided a possible reason behind the insignificant relationship between service cycle time reduction and financial performance. The interviewee mentioned that, in some cases, the reduction in the service cycle time is not important for some customers, especially if they are new. Therefore, if a company tries to reduce the service cycle time and provide faster services, their customers will not pay more, so the financial performance will not increase. However, most companies have established customers, so it is possible that there is no relationship between service cycle time reduction and the improvement in financial performance, for three possible reasons. Firstly, the most important things for established customers may be the quality of the services provided and the fact that the services are delivered in a satisfactory time rather than the quickest time. Secondly, established companies tend to order similar quantities each time, meaning that companies may not increase the quantity of services. Finally, a service cycle time reduction could affect customer retention rather than financial performance. The interviewee from Company A stated:

> The only thing I can put it down to is that, as a general rule, … the time that it takes to provide a service is unimportant to a new customer, if you see what I mean. If you provide a service then, if people maybe get used to a certain service time, and therefore, if you improve it, you are still satisfying that service to the same level. People are not going to pay more for getting things quicker. (Company A)

Regarding the indirect effect, H_{8b} specifies that a service cycle time reduction will positively mediate the relationship between ABC adoption and financial performance. The results of the mediation analysis are reported in Table 6.6. As shown in the table, a service cycle time reduction does not mediate the relationship between ABC adoption and financial performance.

6.3.2.5 Service cycle time reduction and cost reduction in the ABC adoption model

As indicated in H_{8c}, the service cycle time reduction was expected to be positively related to cost reduction. The findings of the analysis show that a positive significant relationship exists between the service cycle time reduction and cost reduction ($\beta = 0.64$, $p \leq 0.001$), as reported in Table 6.5. This study's findings are in line with other research on the manufacturing industry that found a positive, direct relationship between product cycle time reduction and cost reduction (Maiga and Jacobs, 2007, 2008). This assumption also applies to the non-manufacturing industry, and reducing the cycle time of services processes can be achieved by cutting non-value-added time or combining steps to decrease the services costs (Campell, 1995).

6.3.2.6 ABC adoption, cost reduction and financial performance

This research anticipated a positive direct relationship between ABC adoption and cost reduction (H_{9a}). The results in Table 6.5 reveal that ABC adoption has a positive association with cost reduction ($\beta = 0.36$, $p \leq 0.001$). This study obtained results in line with other studies' arguments about the possibility that ABC reduces costs (Anderson and Young, 1999; Ittner et al., 2002). The information provided by ABC helps employees, including managers and accountants, to reduce costs by eliminating activities that do not add any value to consumers or by minimising the number of activities required to produce services by simplifying the work methods. In addition, investment in new technology aims to reduce the time associated with both value and non-value-add activities. This ultimately leads to cost reduction.

In addition, all of the interviewees provided views that support the applicability of ABC adoption for reducing costs. A frequently mentioned reason was that, when companies adopt ABC, they will better understand their activities and the related costs. The interviewees expressed the following views:

> Probably because you are looking at your activities, and you are actually understanding what is driving those activities … and therefore look at what the costs are, and maybe take some costs out because you understand more about what actually influences the activity. (Company A)
>
> Like in our case, the warehousing thing, if we know it takes ... an activity … to unload a container … If you know what is driving the activity on that container, then you can actually allocate your workforce better. (Company A)
>
> Because you are monitoring a very specific cost set, so you are able to adjust your costings accordingly based on the output from [the cost set]. (Company C)

Table 6.5 also shows that cost reduction has a positive association with improved business financial performance ($\beta = 0.51, p \leq 0.001$). The current research findings are in line with other prior research results which found a link between cost reduction and financial performance (Amit, 1986; Rust et al, 2002; Wheeler and Chambers, 1992).

In addition, the qualitative findings obtained from the field interviews provide an explanation of the significant effect of cost reduction on financial performance. One interviewee argued that, if a company reduces its costs, it will see an improvement in financial performance in the short term, but not necessarily in the long term. To elaborate, if companies decide to cut their costs related to the development team, they will see an improvement in their financial performance in the short term, but if they do not follow the development of marketplace, they will end up in a position where customers will not want to buy from them in the future. In other words, it is not necessarily the case that the relationship is positive. If the cost reduction is not carried out carefully, then the financial performance could deteriorate. The following quote reflects one interviewee's opinion:

> [I]f you reduce your cost base, chances are that you will improve the financial performance of the business. [This] does not necessarily go hand in hand, because ... sometimes there can be a short-term measure. You might get a short-term cost reduction, which would improve your financial performance, and if you take cost out of the business ... , for example, say you did product [/service] development, you might take the cost reduction out. You might take all your product development team out of the business, which would save you costs now and improve your financial performance, but if you do not develop products [/services] that are moving with where the marketplace is, then you are going to be in a position where people will not want to buy from you in the future. So I can see it has a positive, but you have to be very careful in terms of the long-term thoughts on it. (Company A)

Other interviewees provide similar comments to the previous comment about the usefulness of ABC with cost reduction and, hence, improved financial performance. The interviewee said:

> Generally, you would expect that one, if your costs are reduced, you are going to have a better performance but I think it is important that the cost reduction is not removing anything of value as opposed to cost … . I think it is all about value, rather than cost. So, I would imagine that, by focusing on activity-based costing, it is possible to illuminate more where the value is linked to cost reduction. (Company B)

Regarding the indirect effect, H_{9b} specifies that cost reduction will positively mediate the relationship between ABC adoption and financial performance. The results of the mediation analysis are reported in Table 6.6. As shown in the table, cost reduction mediates the relationship between ABC adoption and financial performance ($\beta = 0.33$, $p \leq 0.00$), and the indirect effect did not include zero between the lower and upper levels of the 95% confidence interval. Consequently, the role of the cost reduction between ABC adoption and financial performance is full mediation, as there is no direct association between ABC adoption and financial performance. Given that ABC adoption identifies the most relevant cost driver for each activity that may reduce the overhead costs of the service provided. Consequently, the company's financial performance may be increased if it reduces costs. One interviewee agreed with the statistical finding, saying:

> I would have thought that, the closer you monitor your costings and the more directly you assign your costs, then, yes, it would improve the financial performance, but obviously not directly through the reduction of service times, obviously, in cost reduction. (Company C)

Table 6.6: Mediation relationships in the ABC adoption model

Paths	Indirect, direct, total effect	β[a]	LLCI[b]	ULCI[c]	*p* value
Service diversity → Cost structure → ABC adoption	Indirect effect	0.01	-0.01	0.07	0.25
	Direct effect	0.02	-0.24	0.21	0.81
	Total effect	0.03	-0.22	0.22	0.72
Differentiation strategy → Service diversity → ABC adoption	Indirect effect	0.02	-0.20	0.16	0.79
	Direct effect	0.24	-0.04	0.59	0.09
	Total effect	0.26	0.08	0.48	0.00
Differentiation strategy → Cost structure → ABC adoption	Indirect effect	0.04	0.00	0.11	0.05
	Direct effect	0.24	-0.04	0.59	0.09
	Total effect	0.28	0.01	0.61	0.04
ABC adoption → Service quality → Financial performance	Indirect effect	-0.06	-0.26	0.05	0.26
	Direct effect	-0.09	-0.49	0.27	0.65
	Total effect	-0.15	-0.55	0.22	0.46
ABC adoption → Service cycle time reduction → Financial performance	Indirect effect	0.11	-0.08	0.36	0.21
	Direct effect	-0.09	-0.49	0.27	0.65
	Total effect	0.02	-0.46	0.45	0.85
ABC adoption → Cost reduction → Financial performance	Indirect effect	0.33	0.14	0.67	0.00
	Direct effect	-0.09	-0.49	0.27	0.65
	Total effect	0.25	-0.09	0.57	0.15

[a] Standardised coefficient (β).
[b] Lower limit of bootstrapped 95% confidence interval.
[c] Upper limit of bootstrapped 95% confidence interval.

6.4 Modifications to the left section of the ABC adoption model, and the factors which may influence it

One aspect of the field study is to explore the interviewees' opinions about any modification to the left section of the ABC adoption model and whether any of the independent factors in the ABC adoption model are related to each other *($RQ_{1/6}$ – $RQ_{1/8}$)*. First, one interviewee from Company B agreed that competition is positively related to differentiation strategy. This is consisted with (Munteanu, 2015, p. 57) who said "In the era of hyper competition, competitive differentiation has become increasingly important. Brand extensions are used by companies across various industries for competitive differentiation. But in the era of hyper competition, a successful differentiation strategy requires that a brand emphasizes on uniqueness rather than commoditization". Tuanmat and Smith (2011) have recommended that strategic development should only occur in an organisation when it has undertaken a comprehensive review of the business environment. Furthermore, they argue that, within the context of ongoing fluctuations and changes, there is greater competitiveness in the markets, particularly in relation to the provision of reasonably priced goods and higher quality standards. A number of measures can, therefore, be introduced to manage such change, including altering the work practices as a result of the implementation of strategic approaches, which are more consumer focused. Tuanmat and Smith (2011) found that a direct, positive relationship exists between competition and differentiation strategy in small and medium-sized Malaysian manufacturing companies. This study found that there is positive and direct relationship between competition and differentiation strategy ($\beta = 0.85$, $p \leq 0.00$). The interviewee commented:

> I think, if there is high competition, then I think you are going to want to be differentiating yourself. Because you are looking, if the competition is high, you want to … [be]looking to achieve a competitive advantage, aren't you? So you are looking for differentiators. (Company B)

In addition, one objective of the field study was to explore the interviewees' opinions about any possible factors that had not been covered by the current study but were considered relevant in explaining ABC adoption. The interviewees were asked an open-ended question to explore their perceptions regarding the factors of ABC adoption. The first possible factor is financial resources. This factor was also reported by some authors, for example, Rankin (2020), who suggested that financial resources can influence ABC adoption. If a company has funding to implement ABC, then it clearly possesses the necessary financial resources required. (More discussion of the influence of financial resources on costing systems will be addressed in chapter 8, sub-section 8.4.2). The financial director of a business unit commented:

> Proper funding I think, because I think it does cost money [to] put in place and maintain, so the funding of it. I think funding is a big one … . If you need three more people in your accounts department to run the system, but you have not got the money to do that, then you are going to be stopped from doing that, aren't you? So what I mean by funding is having the financial resources to service the infrastructure that you put in place for it. (Company B)

The second possible factor is top management support. (The influence of top management support on costing systems will be addressed further in chapter 8, sub-section 8.4.3). The interviewee describes how to acquire top management support in order to embrace and buy into it, stating:

> The desire, I suppose, of the senior management in an organization to understand and make things work. Activity-based costing is not just a financial thing. It requires non-financial people to make it work and to understand it, so there is the culture ... . The culture of the organization is very important, I think, in the adoption of activity-based costing because, otherwise, if you do not get the culture right, then people are not going to make it work. (Company A)

The third possible factor is enterprise resource planning (ERP), which was mentioned by one interviewee as a facilitating factor that should be included in the ABC adoption model. This factor was also identified in recent research by Rankin (2020), who suggested that the ERP system can impact upon ABC adoption. "One potential variable that has yet to be investigated is the implementation of a new computer or ERP. As companies implement new systems, they may be more likely to adopt ABC as part of the process redesign" (Rankin, 2020, p. 78). "ERP systems provide solutions for enterprises addressing the continued emphasis on controlling costs through improved resource management" (Van Merode et al., 2004, p. 494). The ERP system helps companies to improve the visibility of different activities. In addition, ERP offers real-time information. Thus, ERP helps companies to increase the accuracy of the cost information collected for various activities. The management accountant commented:

> It is a more all-round system. It is the access to the correct systems that allow you to adopt that costing process. It is not just a decision point; it is whether you have the systems to support that internally. I am guessing that is the main driver for most companies - Your ERP system. You have to have an ERP system that supports activity-based costing, which we do not have so we cannot do it. So our main business system that we use is internal. I am guessing that most companies will be in the same position. Unless you have a system that supports it, you cannot use it because it is all-encompassing from every time you place a purchase order to the moment you ship something out of the door. It has to be through a system; unless you are a company of such a small size, you do not use a computer system. (Company C)

6.5 Qualitative findings regarding the performance factors which ABC adoption may influence

In order to address the second group of research questions (*$RQ_{2/5}$ – $RQ_{2/7}$*), the field study also aimed to explore the interviewees' opinions about any possible performance factors which ABC adoption could influence. The interviewees named two factors. The first factor that ABC adoption can influence is the employees' satisfaction with costing systems. This could apply only those staff that are affected directly by ABC and are aware that they are affected directly by it (Tamara at al., 2020) (The influence of costing systems on employee satisfaction with costing systems will be further addressed in chapter 8, sub-section 8.5.1). The financial director from company A commented:

> I think that if you get an activity-based costing system right, and people buy into the system, and appreciate what it can give...it can give managers and employees' satisfaction if they improve the performance of the business through activity, which is not measured in terms of the financial performance, but the satisfaction they get from their job. (Company A)

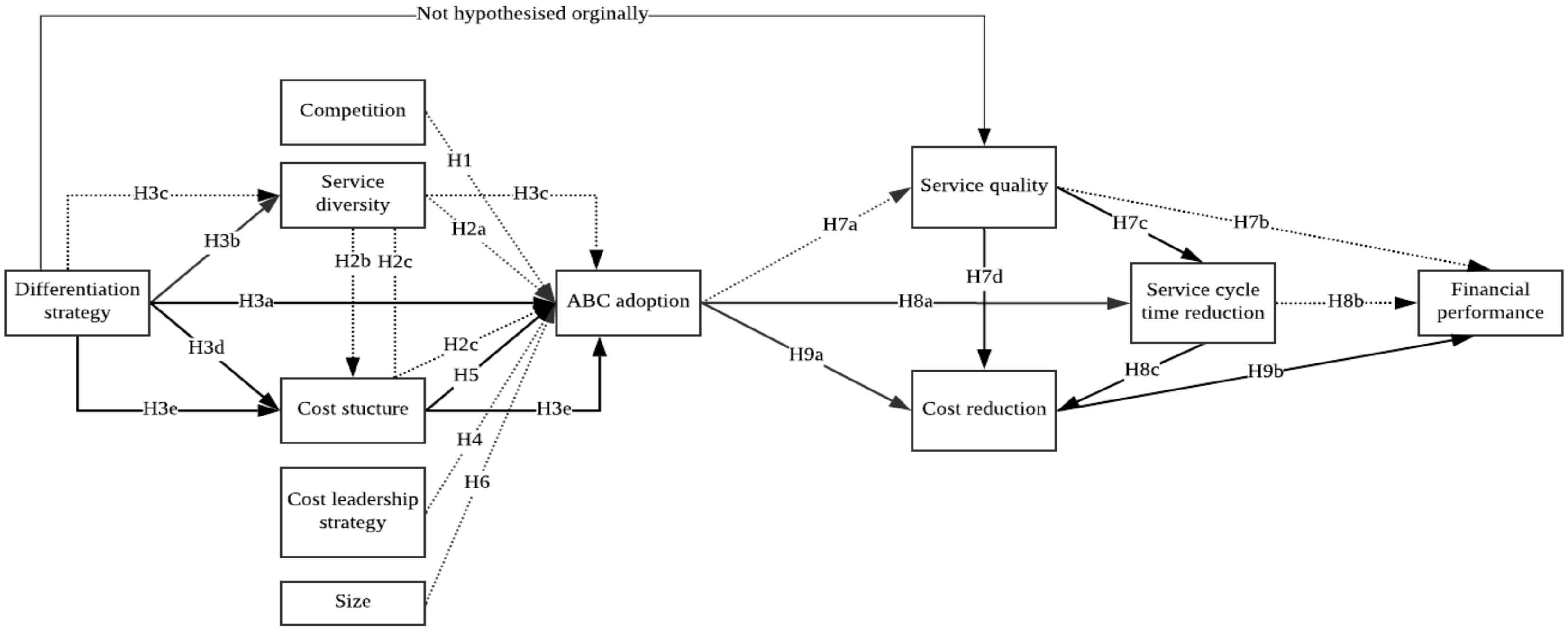
The second factor that ABC adoption could influence is the quality of the decision-making. ABC can help operation managers to enhance the quality of their decision-making. As Cooper and Kaplan (1988b, p. 103) said: "Activity-based costing is not designed to trigger automatic decisions. It is designed to provide more accurate information about production and support activities and product costs so that management can focus its attention on the products and processes with the most leverage for increasing profits. It helps managers make better decisions about product design, pricing, marketing, and mix, and encourages continual operating improvements". In addition, Gupta and Galloway (2003) found that ABC helped organisations to identify their most profitable products and most valuable customers, and also suggested that ABC could predict the costs of designing and developing a new product. Moreover, the strategic value of ABC can offer useful insights into the decision-making process (Ditkaew and Pitchayatheeranart, 2019). ABC not only provides financial information but also tests the activities and processes to identify value–adding and non-value-adding activities and costs. (The influence of costing systems on the quality of decision-making will be further addressed in chapter 8, sub-section 8.5.2.) One interviewee commented:

> ABC can affect the quality of the decision-making. I think it is the quality of the data that it will provide for you, so it will aid the quality of the decision you are making because you are making a decision based on very firm actuals, rather than supposed or assumed actuals. (Company C)

> I think you get very specific feedback, so you will easily be able to identify areas for improvement, or particular products [/services] that you want to take forward and products [/services] you do not want to take forward, as opposed to having a more holistic [view], as we do, a more holistic margin review where you cannot pinpoint what is costing you money and what is not costing you money. (Company C)

6.6 Conclusion

This chapter discussed the descriptive statistics produced for the variables related to ABC adoption. This chapter discussed the quantitative and qualitative results obtained from the questionnaire and interviews, respectively. Quantitative results of the ABC adoption model are presented in Figure 6.4. The main results for the ABC adoption model showed that a differentiation strategy and cost structure had a direct and positive relationship with ABC adoption. In addition, cost structure partially mediated the relationship between differentiation strategy and ABC adoption. Furthermore, cost reduction fully mediated the relationship between ABC adoption and financial performance. The qualitative analysis endorses the quantitative results but also introduces contingent and performance factors that should be considered in future research. Having discussed the quantitative and qualitative results of ABC adoption model, the next chapter will discuss the structural model findings regarding the activity management (AM) usage model.



The solid line indicates a relationship.
The dotted line indicates no relationship.

Figure 6.4: The hypotheses results for the ABC adoption model

Chapter 7: Results and Discussion of the Structural Model for AM Usage

7.1 Introduction

This chapter presents the descriptive statistics for the activity management (AM) usage variable, tests the theoretical research model for AM usage and examines the research hypotheses using the structural equation modelling (SEM) structural model. In addition, this chapter presents some supplementary interview results related to AM usage. Moreover, a discussion of the quantitative and qualitative results regarding the AM usage model is included in this chapter.

This chapter is structured as follows. Section 7.2 presents descriptive statistics for the AM usage variable. Section 7.3 presents the results and discussion of the structural model for AM usage, which includes a discussion of the hypotheses results, and the qualitative findings. Section 7.3 includes three sub-sections, which are: (1) the structural model for activity analysis (AA) usage, the structural model for activity-cost analysis (ACA) usage, and the structural model for activity-based costing (ABC) usage. Finally, section 7.4 concludes this chapter.

7.2 Descriptive statistics for AM usage[63]

In order to address the first question of the first group ($RQ_{1/1}$), this section discusses the descriptive statistics for the AM usage variable (question A_3 on the questionnaire). As shown in Table 7.1, the AM usage in the UK non-manufacturing companies covers: (1) AA usage (mean 2.41 out of 5), (2) ACA usage (mean 2.56 out of 5), and ABC usage (mean 2.43 out of 5).[64] However, Baird et al. (2004) found that Australian private companies used AA on average

[63] The descriptive statistics for the factors that can influence AM usage and outcome variables were discussed in chapter 6, sub-sections 6.2.2 and 6.2.3.
[64] The Kurtosis and Skewness for the AA usage, ACA usage and ABC usage are presented in Appendix 7.2.

(3.91 out of 5), ACA usage on average (3.73 out of 5), and ABC usage on average (3.57 out of 5).[65] This indicates that the usage of AM is higher in Baird et al. (2004) than in the current research. There are two possible ways to explain why Baird et al. (2004) found the greater use of AM than did the current research. First, Baird et al. (2004) focused on both manufacturing and non-manufacturing industries, while the current research targeted only the latter. Second, the wording of the AM statements used by Baird et al. (2004) is slightly different than that used in the current research. For example, the current research defines AA as where the "business unit identifies and analyses the various activities involved in providing services, but without recording their associated costs". However, Baird et al. (2004) used a similar opening statement, but without including the key segment "but without recording their associated costs". Adding this statement makes it clearer to the participants that AA usage is not concerned with costs. The lack of this statement in the research by Baird et al. (2004) may explain why that study reported a higher use of AA compared to the current research. A similar pattern emerges with regard to ACA usage.[66]

Table 7.1: Descriptive statistics for AM usage

A3. AM usage	Mean	Median	Std. Deviation
1. AA usage	2.41	2.00	1.42
2. ACA usage	2.56	2.00	1.40
3. ABC usage	2.43	2.00	1.54

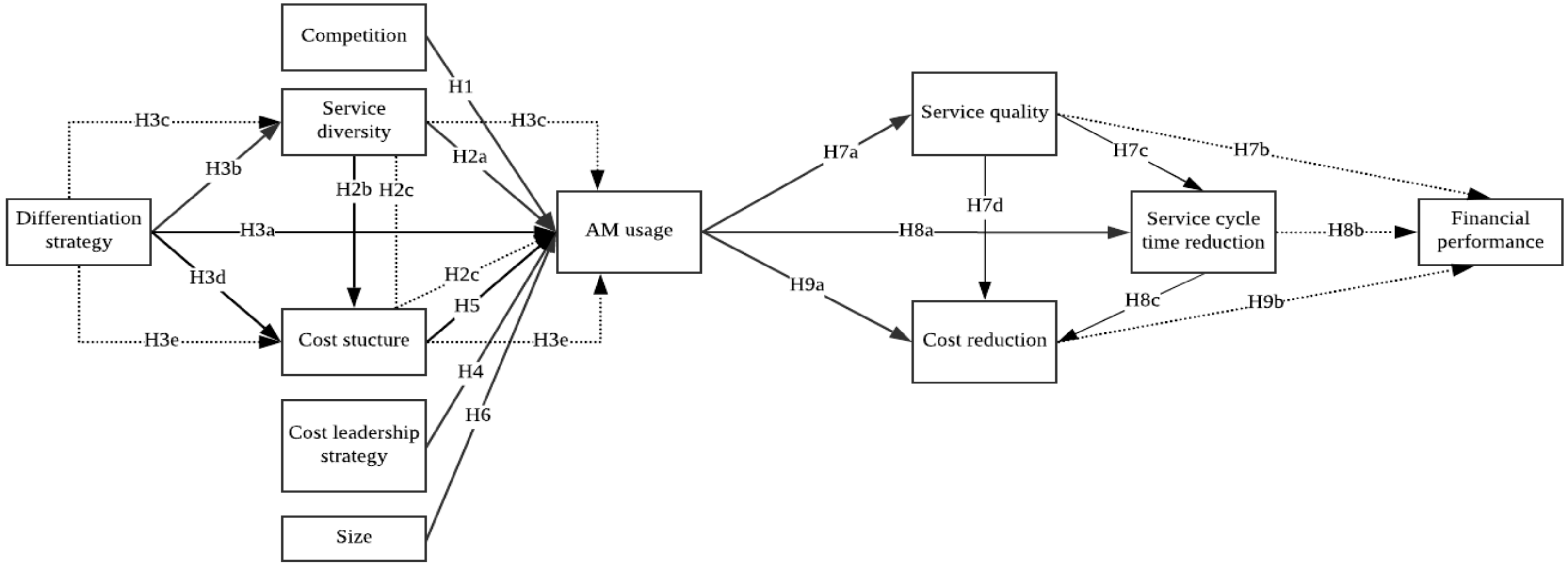
7.3 The results and discussion for the AM usage model

As discussed in chapter 5, sub-sections 5.4.2.2, 5.4.3.2, and 5.4.4.2, the measurement models for AM usage, including AA usage, ACA usage, and ABC usage, were acceptable in terms of meeting all of the criteria (i.e. model fit, factor loading, reliability, validity, and multicollinearity of the research's latent constructs). The next step is testing the structural model for AM usage, which contains two sets of hypotheses. The first set of hypotheses relates

[65] Baird (2007) used a seven-point Likert scale. The mean scores were collapsed into a score out of five to make them comparable with the current research, as the current research used a five-point Likert scale.
[66] More information about the measurement of AM usage is presented in chapter 4, sub-section 4.4.1.5.

to the contingent factors that influence AM usage (H_1-H_6), and these hypotheses addressed the first group of research questions *($RQ_{1/2}$ - $RQ_{1/5}$)*. The second set of hypotheses relates to the influence of AM usage on outcomes, including non-financial and financial performance (H_{7a} - H_{9b}), and these hypotheses addressed the second group of research questions ($RQ_{2/1}$ – $RQ_{2/4}$) (see Figure 7.1).

Most of the results in this section are exploratory in nature because, to the author's knowledge, (1) there has been no literature which has examined the relationship between competition and AM usage; (2) only a limited number of studies have tested the influence of product/service diversity, business strategy, cost structure and size of the business unit on AM usage (e.g. Askarany et al., 2010; Baird, 2007; Baird et al., 2004; Gosselin, 1997); and (3) there has been no literature which examined the relationship between AM usage and non-financial and financial performance.



The solid lines indicate a direct relationship.
The dotted lines indicate a mediation relationship

Figure 7.1: The research hypotheses for the AM usage model

7.3.1 The results and discussion for the AA usage model

Appendix 9.1 presents the structural models for AA usage. This model has unsatisfactory fitness indices, especially for RMSEA, CFI, and IFI (see Appendix 9.2). As discussed in the previous chapter (section 6.3), in order to improve the model fit, it was decided to add a direct relationship between differentiation strategy and service quality. Figure 7.2 shows the AA usage model post-modification. The overall fit of the AA usage structural model is acceptable, as shown in Table 7.2, with Chi-square = 847.175, χ^2/df = 2.06, RMSEA = 0.07, *df* = 411, CFI = 0.91, IFI = 0.91, and PNFI = 0.75.

Table 7.2: Fitness indices for the AA usage structural model post-modification

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 847.175, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	χ^2/df =2.06	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.07	Satisfied
	df	> 0	*df* = 411	Satisfied
	SRMR	≤ 0.08	SRMR = 0.10	Not satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.91	Satisfied
	IFI	≥ 0.90	IFI = 0.91	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.90	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.75	Satisfied

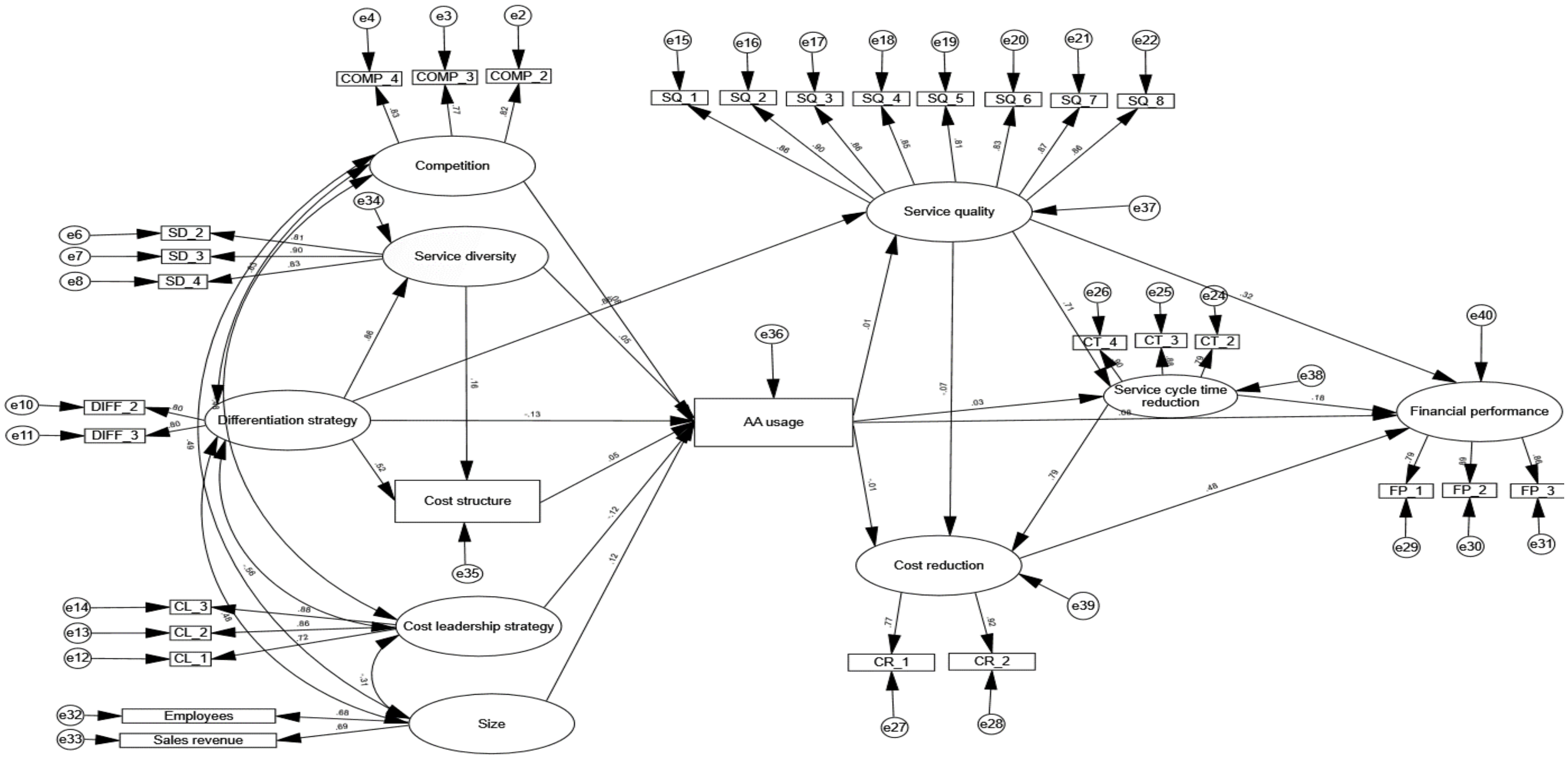


Figure 7.2: The structural model for the AA usage post-modification

7.3.1.1 First research objective: to examine the extent to which a set of contingent factors influence AA usage

7.3.1.1.1 Competition and AA usage

The first hypothesis relating to the AA usage model (H_1) predicts a direct positive impact of competition on AA usage. The result of the current research found no significant relationship between competition and AA usage, as reported in Table 7.3. In addition, the interviewee from Company A was not surprised about the results and mentioned the same reasons which were discussed in the previous chapter about ABC adoption (sub-section 6.3.1.1). This is because competition is an external factor and marketplace-driven, which is unrelated to internal organisational procedures like AA. Furthermore, the interviewee from Company A explained that the reason for the lack of a relationship between competition and AA usage is that many companies do not know exactly what their competitors provide; thus, there is scarce information concerning their competitors, meaning that they lack knowledge about the level of competition that might influence factors such as AA.

Given the above quantitative and qualitative results, it is possible that there is no relationship between competition and AA usage.

Table 7.3: Summary of the results for the AA usage model

Exogenous variables	Endogenous variables													
	AA usage		Cost structure		Service diversity		Service quality		Service cycle time reduction		Cost reduction		Financial performance	
	β^a	*p* value	β^a	*p* value	β^a	*p* value	β^a	*p* value	β^a	*p* value	β^a	*p* value	β^a	*p* value
Competition	0.08	0.68												
Service diversity	0.05	0.79	0.16	0.25										
Cost structure	0.05	0.59												
Differentiation strategy	-0.13	0.68	0.52	0.00*	0.86	0.00*	0.86	0.00*						
Cost leadership strategy	-0.12	0.21												
Size	0.12	0.29												
AA usage							0.01	0.82	0.03	0.59	-0.01	0.82	0.08	0.07
Service quality									0.71	0.00*	-0.07	0.46	0.32	0.00*
Service cycle time reduction											0.79	0.00*	0.18	0.11
Cost reduction													0.48	0.00*

* *p* value < 0.001 (two-tailed).

a Standardised coefficient (β).

7.3.1.1.2 Service diversity and AA usage

Service diversity was hypothesised in H_{2a} as positively increasing the use of AA. The finding points to the fact that service diversity has no association with AA usage, as reported in Table 7.3. The results of this research do not differ from the prior AA usage studies, that also failed to find a statistically significant relationship between product/service diversity and AA usage in manufacturing and non-manufacturing industries (Baird, 2007; Baird et al., 2004).

The interviewee from company A agreed with the statistical result and thought that, when companies decide to diversify their services, they may not use AA because AA usage entails spending time identifying and analysing various activities involved in providing services. Thus, the cost of the time taken to gather the information is greater than the benefit gained from that information.

7.3.1.1.3 Cost structure and AA usage

Cost structure was hypothesised in H_5 as positively increasing the use of AA. The result of the current study found no relationship between cost structure and AA usage, as presented in Table 7.3. The current research finding is in line with other AA usage studies, which failed to detect a significant relationship between cost structure and AA usage in manufacturing and non-manufacturing industries (Baird, 2007; Baird et al., 2004). The interviewees were asked about the reason for the lack of a relationship between cost structure and AA usage. The interviewee from Company A expected that there would be no relationship between the two variables. The increase in indirect costs, such as the rent for the company building, does not lead to using AA to identify and analyse activities.

7.3.1.1.4 Service diversity, cost structure and AA usage

As stated in H_{2b}, it is expected that service diversity is related positively with cost structure. The results in Table 7.3 reveal that service diversity is unrelated to cost structure.[67] Regarding the indirect effect, the results of the mediation analysis are reported in Table 7.4 below. As shown in the table, cost structure does not mediate the relationship between service diversity and AA usage.

7.3.1.1.5 Business strategy and AA usage

A differentiation strategy was hypothesised in H_{3a} as positively increasing the use of AA. This result suggests that differentiation strategy has no relationship with AA usage, as reported in Table 7.3.[68] In addition, the interviewee from Company A agreed with the current statistical results and believed that there was no relationship between differentiation strategy and AA usage because, when companies differentiate their services, they are more focused on recording the costs of these services than on identifying and analysing the number of activities.

A cost leadership strategy was hypothesised in H_4 as being negatively related with AA usage. The finding points to the fact that the cost leadership strategy has no association with AA usage, as reported in Table 7.3. The interviewee from Company A felt that this finding was unsurprising, because he believed that the cost leadership strategy focused on providing the lowest cost of services, which is unrelated to AA.

Notwithstanding the theory that prompted the hypothesis about the relationship between the four variables (differentiation strategy-AA usage, and cost leadership strategy-AA usage), it is

[67] The relationship between service diversity and cost structure was discussed in chapter 6, sub-section 6.3.1.4.

[68] The current research finding conflicts with one study in AM, which found a significant, direct relationship between the prospector strategy (differentiator) and AM (Gosselin, 1997). There are two possible reasons for the significant relationship found in Gosselin (1997): first, he included all three usages of AM (i.e. AA, ACA, and ABC) in a single measure as a dependent variable; second, the number of companies using ABC (n = 77) was greater than those using AA and ACA (n = 45).

possible, given the lack of prior research to back up the hypothesis, and the empirical results from the quantitative and qualitative analysis, to say that they may not be related.

7.3.1.1.6 Differentiation strategy, service diversity and AA usage

As stated in H_{3b}, it is expected that differentiation strategy is related positively with service diversity. The results in Table 7.3 reveal that differentiation strategy is positively associated with service diversity ($\beta = 0.86$, $p \leq 0.001$).[69] As discussed in sub-section 7.3.1.1.2, the result of the current study found no relationship between service diversity and AA usage. Regarding the indirect effect, the results of the mediation analysis are reported in Table 7.4 below. As shown in the table, service diversity does not mediate the relationship between differentiation strategy and AA usage.

7.3.1.1.7 Differentiation strategy, cost structure and AA usage

H_{3d} proposed that there is a positive relationship between differentiation strategy and cost structure, and this is supported by the findings shown in Table 7.3 ($\beta = 0.52$, $p \leq 0.001$).[70] As discussed in sub-section 7.3.1.1.3, the result of the current study found no relationship between cost structure and AA usage. Concerning a potentially indirect effect, Table 7.4 presents the mediation relationship findings, demonstrating that the relationship between differentiation strategy and AA usage is not mediated by cost structure.

7.3.1.1.8 Differentiation strategy and service quality in the AA usage model

The relationship between differentiation strategy and service quality is expected to be positive. This relationship was not hypothesised originally, but the path between differentiation strategy and service quality was added to the AA usage structural model in order to improve the model

[69] The relationship between differentiation strategy and service diversity was discussed in chapter 6, sub-section 6.3.1.6.
[70] Chapter 6, sub-section 6.3.1.7, discussed the relationship between differentiation strategy and cost structure.

fit. As shown in Table 7.3, there is a positive association between differentiation strategy and service quality ($\beta = 0.86$, $p \leq 0.001$).[71]

7.3.1.1.9 Size of the business unit and AA usage

As indicated in H_6, the size of business unit is expected to be positively related to AA usage. The findings of the analysis show that no significant relationship exists between size of the business unit and AA usage, as reported in Table 7.3. This finding is consistent with Baird's (2007) study, which found that the size of an organisation, when measured by the number of employees, did not influence the AA usage in Australian public manufacturing and non-manufacturing companies. The results of the current study, however, contradict those of another AA usage study, which found a significant relationship between size, as measured by the number of employees, and AA usage in Australian private manufacturing and service companies (Baird et al., 2004). Baird (2007) argued that the relationship between size and the use of AA in the private sector is greater than in the public sector. Indeed, companies in public sector are more likely to use the highest level of AM, like ABC, rather than AA, since public companies have the ability to commit resources to the development and implementation of the practice (Baird, 2007).

The interviewees were asked about the reason behind the lack of a relationship between size and AA usage. They believed that various factors, such as financial resources and top management support, can influence AM usage (specifically ABC usage) more than the size of the business unit, which will be discussed in sub-section 7.3.3.3.

[71] The discussion of the relationship between differentiation strategy and service quality was presented in chapter 6, sub-section 6.3.1.8.

7.3.1.2 Second research objective: to examine the indirect influence of AA usage on financial performance through non-financial performance factors

7.3.1.2.1 AA usage, service quality and financial performance

Hypothesis H_{7a} of the AA usage model specifies a positive, direct relationship between AA usage and service quality. The results in Table 7.3 reveal that AA usage has no association with service quality. To the author's knowledge, no literature has tested the influence of AA usage on service quality. In terms of the insignificant effect of AA usage on service quality, as detailed in the existing study, the original AA usage model did not develop the hypotheses associated with the differentiation strategy and service quality. Nonetheless, in order to improve the model fit, as detailed in sub-section 7.3.1, it was included in the original AA usage model. In this context, the relationship between differentiation strategy and service quality is significant, with a high standardised coefficient ($\beta = 0.86$, $p \leq 0.001$), that may lead to the relationship between AA usage and service quality disappearing.

Table 7.3 also shows that service quality is positively and significantly related to financial performance ($\beta = 0.32$, $p \leq 0.001$).[72] In addition, the research found that there is no relationship between AA usage and financial performance. One interviewee form Company B was surprised by the hypothesis result because he believed that, if companies use AA, they should benefit from it. It could be that they are not using it sufficiently for there to be a significant effect.

On the other hand, other interviewees were unsurprised at the statistical findings regarding the lack of a relationship between AA usage and financial performance. They believed that financial performance is affected by other factors. One key point was that financial performance can be impacted by a factor that occurs outside its control. One financial director commented:

[72] The relationship between service quality and financial performance was discussed in chapter 6, sub-section 6.3.2.1.

> I think, because there are so many factors, you can put a cost driver in, but ... you can set up a cost driver that might be the number of units that a warehouse does, but the warehouse might be affected by something else that happens outside its control. For example, containers might arrive late and things like that, and then the benefits of an activity [analysis] model do not really work. (Company A)

The second reason for the lack of a relationship between AA and financial performance is the organisational culture. Innovation, an outcome orientation, and a tight versus loose control are examples of the dimensions of organisational culture (Baird et al., 2004). Once identified as beneficial, AA usage will be implemented. However, there is limited impact on business performance simply by introducing AA, ACA or ABC into the organisation (Baird et al., 2004). To enable a business truly to improve its performance, organisations must ensure they are proactively taking measures to increase their opportunities for success (Baird et al., 2004). The interviewee stated:

> I think, potentially, there are other, bigger factors that affect financial performance, that are unrelated to costing. It comes back again to the culture of the organization, and then actually you can produce a lot of data out of an activity [analysis] but, if people do not use it as information and act on it, then it would not have any effect on the financial performance. (Company A)

The third factor is that financial performance can be affected by external factors, such as market influences, including foreign exchange. The interviewee explained this by citing an example of how market influences impact financial performance in specific contexts. However, the quotation below is highly specific to a certain context, exchange rate fluctuations. However, these may have an insignificant effect on other organisations' financial performance. The interviewee said:

> Because there are things like market influences. For example, our business imports a lot of products [/services] from the Far East, which we buy in a foreign currency, and the foreign exchange markets can be quite volatile, particularly at the moment, with the political situation in the UK, and that can have more effect on your financial performance than understanding what activities you do. For example, we buy a lot of products [/services] in US dollars, and the exchange rate since 2016 to date has deteriorated by about 25%, so the costs of our goods have increased by 25%, so that has more of a material effect on our financial performance than understanding the cost drivers, because the activity [analysis] would not assist that because it is a market influence. Our selling prices have not gone up because the marketplace has not increased its selling price, but our cost of goods has gone up because of the exchange rate. (Company A)

The qualitative findings emanating from the field interviews provide some possible explanations for the non-significant effect of AA usage on financial performance. External factors, such as foreign exchange, and internal factors, such as the organisational culture, may explain why there is no relationship between these two variables.

Regarding the indirect effect, H_{7b} specifies that service quality will positively mediate the relationship between AA usage and financial performance. The results of the mediation analysis are reported in Table 7.4 below. As shown in the table, service quality does not mediate the relationship between AA usage and financial performance because there is no relationship between AA usage and service quality.

7.3.1.2.2 Service quality and service cycle time reduction in the AA usage model

As indicated in H_{7c}, service quality is expected to be positively related to service cycle time reduction. The findings of the analysis show that a positive significant relationship exists between service quality and service cycle time reduction ($\beta = 0.71$, $p \leq 0.001$), as reported in Table 7.3.[73]

7.3.1.2.3 Service quality and cost reduction in the AA usage model

Service quality was hypothesised in H_{7d} as having a negative relationship with cost reduction. The finding points to the fact that service quality has no association with cost reduction, as reported in Table 7.3.

[73] The relationship between service quality and service cycle time reduction was discussed in chapter 6, sub-section 6.3.2.2.

7.3.1.2.4 AA usage, service cycle time reduction and financial performance

Hypothesis H_{8a} of the AA usage model specifies a positive, direct relationship between AA usage and service cycle time reduction. The results in Table 7.3 reveal that AA usage has no association with service cycle time reduction. To the author's knowledge most previous studies have focused on the relationship between ABC adoption and service/product cycle time reduction rather than AM usage levels (Fei and Isa, 2010; Ittner et al., 2002). As discussed in chapter 6, sub-section 6.3.2.4, these studies found a positive, direct relationship between the two variables. A possible reason for the lack of a relationship between AA usage and service cycle time reduction is that AA usage aims to identify and analyse various activities without recording their associated costs. It does not attach costs to each activity and cannot help to determine where non-value-added activities cost more and does not allow the prioritisation of their elimination. Thus, the use of AA cannot help companies to remove the activities that do not add value to the services.

Table 7.3 also shows that the service cycle time reduction has no association with financial performance.[74] Regarding the indirect effect, H_{8b} specifies that service cycle time reduction will positively mediate the relationship between AA usage and financial performance. The results of the mediation analysis are reported in Table 7.4 below. As shown in the table, service cycle time reduction does not mediate the relationship between AA usage and financial performance.

7.3.1.2.5 Service cycle time reduction and cost reduction in the AA usage model

As indicated in H_{8c}, service cycle time reduction is expected to be positively related to cost reduction. The findings of the analysis show that a positive, significant relationship exists

[74] The relationship between service cycle time reduction and financial performance was discussed in chapter 6, sub-section 6.3.2.4.

between service cycle time reduction and cost reduction ($\beta = 0.79$, $p \leq 0.001$), as reported in Table 7.3.[75]

7.3.1.2.6 AA usage, cost reduction and financial performance

Hypothesis H_{9a} of the AA usage model specifies a positive, direct relationship between AA usage and cost reduction. The results in Table 7.3 reveal that AA usage is not associated with cost reduction. This is an exploratory research as most studies focus on the influence of ABC adoption on cost reduction. However, the qualitative findings emanating from the field interviews provide some explanation of the non-significant effect of AA usage on cost reduction. The interviewee from Company A believed that, if companies used AA, they only identified and analysed activities; they did not know whether cost reduction occurred or not, since AA usage does not provide adequate information about the costs associated with services. On the other hand, if companies use third-level AM (i.e. ABC usage), this can influence cost reduction because the third stage of AM allows companies to identify their value-added and non-value-added costs (see sub-section 7.3.3.2.6 for further discussion of the influence of ABC usage on cost reduction).

Table 7.3 also shows that cost reduction has a positive association with financial performance ($\beta = 0.48$, $p \leq 0.001$).[76] Regarding the indirect effect of H_{9b}, cost reduction does not mediate the relationship between AA usage and financial performance (see Table 7.4).

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[75] The relationship between service cycle time reduction and cost reduction was discussed in chapter 6, sub-section 6.3.2.5.

[76] The relationship between cost reduction and financial performance was discussed in chapter 6, sub-section 6.3.2.6.

Table 7.4: Mediation relationships in the AA usage model

Paths	Indirect, direct, total effect	β[a]	LLCI[b]	ULCI[c]	*p* value
Service diversity → Cost structure → AA usage	Indirect effect	0.02	-0.04	0.18	0.40
	Direct effect	0.09	-0.79	0.81	0.83
	Total effect	0.10	-0.76	0.86	0.78
Differentiation strategy → Service diversity → AA usage	Indirect effect	0.07	-0.60	0.67	0.80
	Direct effect	-0.20	-1.12	0.97	0.68
	Total effect	-0.14	-0.77	0.59	0.68
Differentiation strategy → Cost structure → AA usage	Indirect effect	0.04	-0.09	0.26	0.47
	Direct effect	-0.20	-1.12	0.97	0.68
	Total effect	-0.16	-1.06	0.93	0.72
AA usage → Service quality → Financial performance	Indirect effect	0.00	-0.02	0.02	0.82
	Direct effect	0.04	-0.01	0.10	0.09
	Total effect	0.05	0.00	0.10	0.07
AA usage → Service cycle time reduction→ Financial performance	Indirect effect	0.00	-0.01	0.03	0.36
	Direct effect	0.04	-0.01	0.10	0.09
	Total effect	0.05	0.00	0.10	0.07
AA usage → Cost reduction → Financial performance	Indirect effect	0.00	-0.04	0.03	0.78
	Direct effect	0.04	-0.01	0.10	0.09
	Total effect	0.04	-0.02	0.10	0.18

[a] Standardised coefficient (β).
[b] Lower limit of bootstrapped 95% confidence interval.
[c] Upper limit of bootstrapped 95% confidence interval.

7.3.2 The results and discussion for the ACA usage model

The structural model for the ACA produced similar results to the AA usage model. The first version of the ACA structural model was not satisfied in relation of some of the fitness indices (e.g. RMSEA, CFI, IFI) (see Appendix 9.3 and 9.4). To improve the model fit, the direct relationship between differentiation strategy and service quality was added (see Figure 7.3). The structural model for the ACA post-modification in term of the modification indices was satisfied, with Chi-square = 857.819, χ^2/df = 2.09, RMSEA = 0.07, *df* = 411, CFI = 0.91, IFI = 0.91, and PNFI = 0.74 (see Table 7.5).

Table 7.5: Fitness indices for the ACA usage structural model post-modification

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 857.819, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	χ^2/df =2.09	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.07	Satisfied
	df	> 0	*df* = 411	Satisfied
	SRMR	≤ 0.08	SRMR = 0.10	Not satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.91	Satisfied
	IFI	≥ 0.90	IFI = 0.91	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.90	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.74	Satisfied

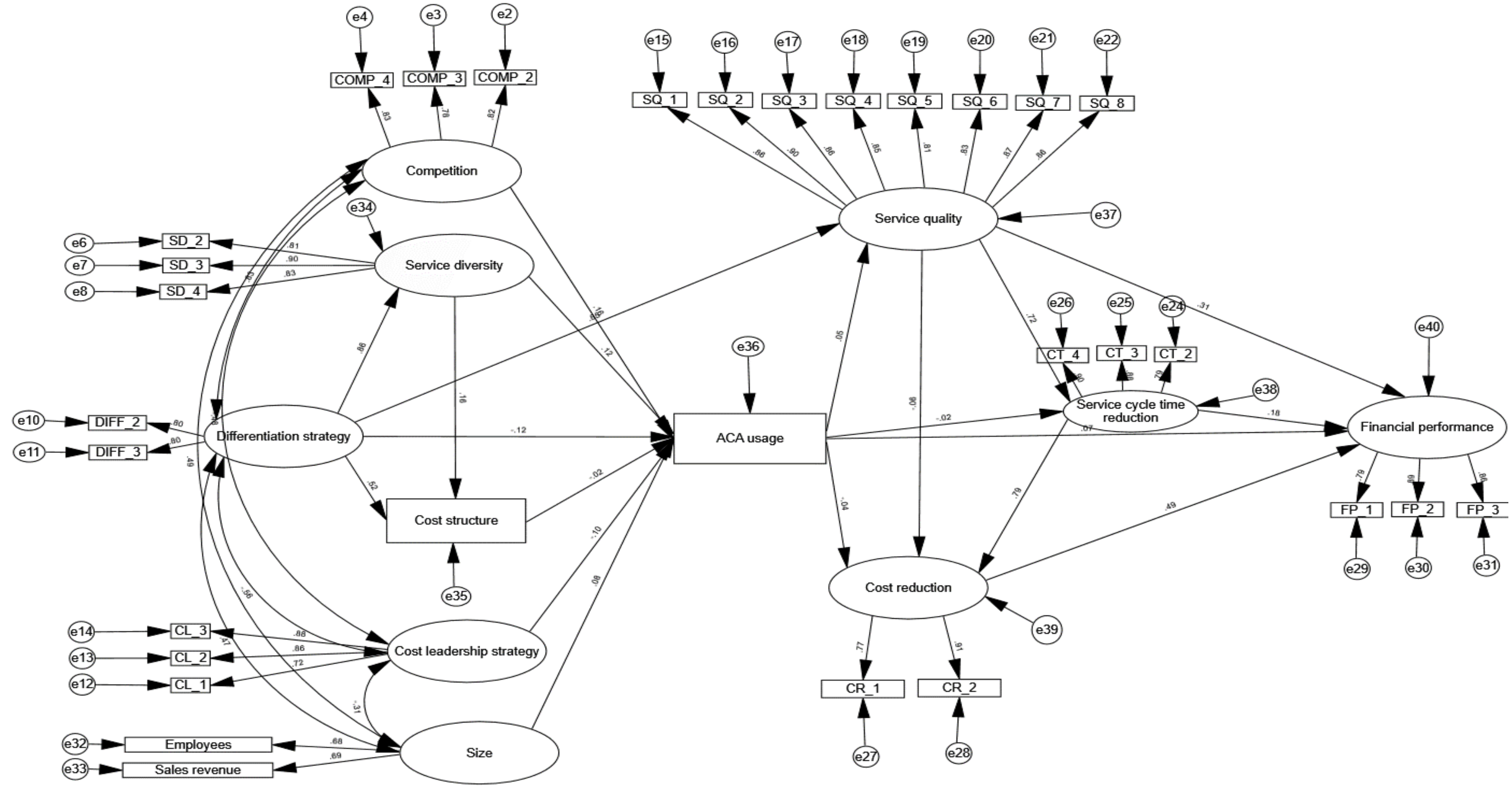

Figure 7.3: The structural model for the ACA usage post-modification

7.3.2.1 First research objective: to examine the extent to which a set of contingent factors influence ACA usage

As mentioned earlier the results for the research hypotheses related to the influence of contingent factors on the ACA usage model produced similar results to that for the AA usage model, which are summarised below in Table 7.6. In addition, the qualitative results from the interviewees for the ACA usage model are similar to those for the AA usage model.

Table 7.6: The hypotheses' results relating to the influence of the contingent factors on ACA usage

No	Hypotheses for ACA usage model	Hypotheses results
H_1	The level of competition is related positively to ACA usage.	Rejected
H_{2a}	The level of service diversity is related positively to ACA usage.	Rejected
H_{2b}	The level of service diversity is related positively to cost structure.	Rejected
H_{2c}	The impact of the level of service diversity on the ACA usage is mediated positively by cost structure.	Rejected
H_{3a}	The differentiation strategy is related positively to ACA usage.	Rejected
H_{3b}	The differentiation strategy is related positively to service diversity.	Supported
H_{3c}	The impact of the differentiation strategy on ACA usage is mediated positively by the level service diversity.	Rejected
H_{3d}	The differentiation strategy is related positively to cost structure.	Supported
H_{3e}	The impact of the differentiation strategy on ACA usage is mediated positively by cost structure.	Rejected
H_4	The cost leadership strategy is related negatively to ACA usage.	Rejected
H_5	The level of indirect costs is related positively to ACA usage.	Rejected
H_6	The size of business unit is related positively to ACA usage.	Rejected

7.3.2.2 Second research objective: to examine the indirect influence of ACA usage on financial performance through non-financial performance factors

The results of the research hypotheses and interviews related to the influence of ACA usage on non-financial and financial performance are similar to those for the AA usage model, which are summarised in Table 7.7. The statistical results for the ACA usage model are presented in Tables 7.8 and 7.9.

Table 7.7: The hypotheses' results relating to the influence of ACA usage on performance

No	Hypotheses for ACA usage model	Hypotheses results
H_{7a}	ACA usage is related positively to the improvements in service quality.	Rejected
H_{7b}	The impact of ACA usage on financial performance is mediated positively by service quality.	Rejected
H_{7c}	Service quality is related positively to service cycle time reduction.	Supported
H_{7d}	Service quality is related negatively to cost reduction.	Rejected
H_{8a}	ACA usage related positively to the service cycle time reduction.	Rejected
H_{8b}	The impact of ACA usage on financial performance is mediated positively by the service cycle time reduction.	Rejected
H_{8c}	Service cycle time reduction is related positively to cost reduction.	Supported
H_{9a}	ACA usage is related positively to cost reduction.	Rejected
H_{9b}	The impact of ACA usage on financial performance is mediated positively by cost reduction.	Rejected

Table 7.8: Summary of the results for the ACA usage model

Exogenous variables	Endogenous variables													
	ACA usage		Cost structure		Service diversity		Service quality		Service cycle time reduction		Cost reduction		Financial performance	
	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value
Competition	0.16	0.39												
Service diversity	0.12	0.55	0.16	0.25										
Cost structure	-0.02	0.83												
Differentiation strategy	-0.12	0.71	0.53	0.00*	0.86	0.00*	0.85	0.00*						
Cost leadership strategy	-0.10	0.28												
Size	0.08	0.46												
ACA usage							0.05	0.35	-0.02	0.73	-0.04	0.45	0.07	0.12
Service quality									0.72	0.00*	-0.06	0.53	0.31	0.00*
Service cycle time reduction											0.79	0.00*	0.18	0.11
Cost reduction													0.49	0.00*

* *p* value < 0.001 (two-tailed).

[a] Standardised coefficient (β).

Table 7.9: Mediation relationships in the ACA usage model

Paths	Indirect, direct, total effect	β[a]	LLCI[b]	ULCI[c]	*p* value
Service diversity → Cost structure → ACA usage	Indirect effect	-0.01	-0.14	0.06	0.77
	Direct effect	0.19	-0.76	0.93	0.69
	Total effect	0.19	-0.72	0.91	0.67
Differentiation strategy → Service diversity → ACA usage	Indirect effect	0.15	-0.59	0.75	0.67
	Direct effect	-0.18	-1.31	1.03	0.70
	Total effect	-0.03	-0.75	0.67	0.92
Differentiation strategy → Cost structure → ACA usage	Indirect effect	-0.02	-0.18	0.19	0.87
	Direct effect	-0.18	-1.31	1.03	0.70
	Total effect	-0.19	-1.29	0.95	0.73
ACA usage → Service quality → Financial performance	Indirect effect	0.01	-0.01	0.03	0.37
	Direct effect	0.04	-0.01	0.10	0.13
	Total effect	0.05	-0.01	0.11	0.07
ACA usage → Service cycle time reduction → Financial performance	Indirect effect	0.00	-0.03	0.01	0.45
	Direct effect	0.04	-0.01	0.10	0.13
	Total effect	0.04	-0.02	0.10	0.17
ACA usage → Cost reduction → Financial performance	Indirect effect	-0.01	-0.05	0.02	0.48
	Direct effect	0.04	-0.01	0.10	0.13
	Total effect	0.03	-0.04	0.09	0.42

[a] Standardised coefficient (β).
[b] Lower limit of bootstrapped 95% confidence interval.
[c] Upper limit of bootstrapped 95% confidence interval.

7.3.3 The results and discussion for the ABC usage model

Appendix 9.5 shows the structural model for ABC usage. This model has unsatisfactory fitness indices, especially for RMSEA and TLI or NNFI, that are below the acceptable value (see Appendix 9.6). The CFI and IFI have acceptable values but in the minimum range. It was decided to add a direct relationship between differentiation strategy and service quality in order to improve the model fit. Figure 7.4 shows the ABC usage model post-modification. The overall fit of the ABC usage structural model is acceptable, as shown in Table 7.10, with Chi-square = 820.603, χ^2/df = 2.00, RMSEA = 0.07, df = 411, CFI = 0.92, IFI = 0.92, TLI or NNFI = 0.91, and PNFI = 0.75.

Table 7.10: Fitness indices for the ABC usage structural model post-modification

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 820.603$, $p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	χ^2/df =2.00	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.07	Satisfied
	df	> 0	df = 411	Satisfied
	SRMR	≤ 0.08	SRMR = 0.09	Not satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.92	Satisfied
	IFI	≥ 0.90	IFI = 0.92	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.91	Satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.75	Satisfied

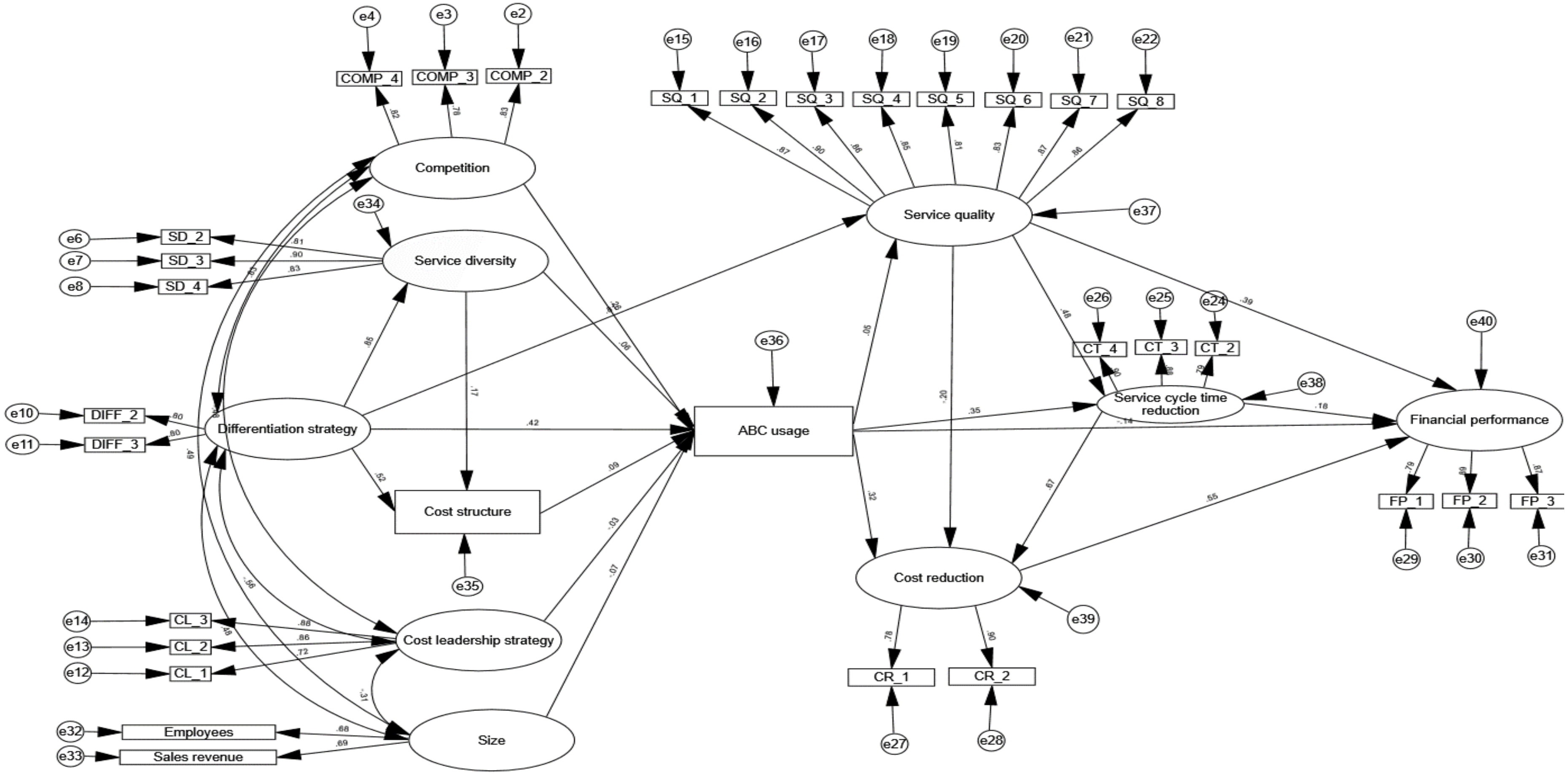

Figure 7.4: The structural model for the ABC usage post-modification

7.3.3.1 First research objective: to examine the extent to which a set of contingent factors influence ABC usage

7.3.3.1.1 Competition and ABC usage

The results confirmed the ABC usage model's first hypothesis (H_1). As shown in Table 7.11, a positive, statistically significant relationship was identified between competition and ABC usage ($\beta = 0.26$, $p \leq 0.05$). All of the interviewees agreed with the statistical result because they believed that competition is related significantly to ABC usage. If companies face high competition in the market, they tend to use a better costing system to improve their costing process. These companies tend to reduce the prices of their services to gain competitive advantages. The interviewees expressed their thoughts as follows:

> I suspect that it is, if you are doing activity-based costing, and you have got competition, against your competition, and you have got improved costing processes, then you have got something that is a better model than your competitors. (Company A)

> I think, if the competition is high, you are just looking to, for whatever you can do to improve your competitive advantage, you cannot ignore costs in that situation, too. In order to be able to compete, you might have to reduce your prices. (Company B)

> ABC can help competitors' companies…Very specific products [/services]. Obviously, if you have got a product [/service] that is not unique, then you need to use every possible advantage to try and reduce your costs, so I assume that assists there. (Company C)

Given the above, the qualitative results support the quantitative results, which are also in line with Cooper and Kaplan's (1988a) theoretical argument about the relationship between competition and ABC. They argued that competitive environments encourage organisations to use sophisticated costing systems, such as ABC, to make optimal decisions. If companies face high competition in the market, they will focus more on the price of the services/products provided. Thus, the use of ABC helps them to record and use cost information to calculate the cost of each service provided, which gives them a competitive advantage. Overall, the significant relationship is seen in ABC usage, but not for AA and ACA, and it appears that this is because AA and ACA do not use the cost information to calculate the cost of each service provided. Therefore, regarding the AM principles, competition appears to have an influence on ABC usage only.

As discussed in this sub-section, a significant relationship exists between ABC usage and competition, although not in terms of ABC adoption (see sub-section 6.3.1.1). Although competition may not form an aspect of the decision to adopt ABC, it might comprise part of the decision to use ABC taken by companies that use it to a limited extent (and have not adopted it). Essentially, the number of companies using ABC (including those that have not adopted it) are still using it due to their awareness of the marketplace competition.

When using the ABC adoption model (chapter 6) and ABC usage model (the current chapter), conflict could potentially arise between each of the research models due to the difference between ABC adoption measurement and ABC usage. The ABC adoption variable was measured according to ABC adoption/non-adoption. ABC usage was measured using a five-point Likert scale, thus capturing how ABC is practised to varying intensity levels. It would be challenging to determine what the most appropriate means of measuring ABC is (either adoption or usage), given that it is possible that a company may adopt ABC yet make relatively little use of it. Likewise, certain companies may have not permanently adopted ABC, despite the fact that they were using it. Respondents who have adopted ABC are expected to answer to a large extent or very large extent when asked about their usage of it, however, this is not the case (as shown in Table 7.12). Respondents who have other experiences of ABC (e.g. intending to adopt ABC or currently investigating whether to adapt ABC) are expected to report that their ABC usage is little or none, however, this is not the case (as shown in Table 7.12). Respondents who intended to investigate whether to adopt ABC in the near future, have adopted ABC and decided to abandon it, have investigated whether to adopt ABC and decided to reject it, considered whether to adopt ABC but did not investigate it and decided to reject it, and never considered whether to adopt ABC were expected to report that they have never used ABC, however, this is not the case (as shown in Table 7.12).

Table 7.11: Summary of the results for the ABC usage model

Exogenous variables	Endogenous variables													
	ABC usage		Cost structure		Service diversity		Service quality		Service cycle time reduction		Cost reduction		Financial performance	
	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value	β[a]	*p* value
Competition	0.26	0.05												
Service diversity	0.06	0.64	0.17	0.22										
Cost structure	0.09	0.20												
Differentiation strategy	0.42	0.07	0.52	0.00*	0.85	0.00*	0.81	0.00*						
Cost leadership strategy	-0.03	0.65												
Size	-0.07	0.33												
ABC usage							0.05	0.50	0.35	0.00*	0.32	0.00*	-0.14	0.06
Service quality									0.48	0.00*	-0.20	0.02	0.39	0.00*
Service cycle time reduction											0.67	0.00*	0.18	0.10
Cost reduction													0.55	0.00*

* *p* value < 0.001 (two-tailed).

[a] Standardised coefficient (β).

Table 7.12: The relationship between ABC adoption and ABC usage

ABC adoption	ABC usage										
	Not at all		Small extent		Medium extent		large extent		Very large extent		Total
	N	%	N	%	N	%	N	%	N	%	N
1. Have adopted ABC	0	0.00%	1	2.33%	1	2.33%	6	13.95%	35	81.40%	43
2. Intending to adopt ABC	4	25.00%	4	25.00%	4	25.00%	3	18.75%	1	6.25%	16
3. Currently investigating whether to adopt ABC	5	26.32%	7	36.84%	3	15.79%	3	15.79%	1	5.26%	19
4. Intending to investigate whether to adopt ABC in the near future	8	44.44%	6	33.33%	2	11.11%	2	11.11%	0	0.00%	18
5. Adopted ABC and decided subsequently to abandon it	8	50.00%	8	50.00%	0	0.00%	0	0.00%	0	0.00%	16
6. Investigated whether to adopt ABC and decided to reject it	5	45.45%	4	36.36%	2	18.18%	0	0.00%	0	0.00%	11
7. Have considered whether to adopt ABC, but did not investigate it and decided to reject it	8	47.06%	6	35.29%	2	11.76%	1	5.88%	0	0.00%	17
8. Never considered whether to adopt ABC	46	71.88%	8	12.50%	4	6.25%	6	9.38%	0	0.00%	64
Total											204

7.3.3.1.2 Service diversity and ABC usage

The purpose of H_{2a} was to examine the direct impact of service diversity on ABC usage. As indicated in Table 7.11, service diversity is unrelated to ABC usage. The results of this research differ from those of the prior ABC usage studies that find a significant relationship between product/service diversity and ABC usage in manufacturing and non-manufacturing industries (Baird, 2007; Baird et al., 2004). As discussed in sub-section 7.3.1.1.2, the research is exploratory and service diversity is expected to have a direct, positive relationship with ABC usage. This is because service diversity exists only where services require activities and resources in differing proportions, which creates a need for ABC usage to capture the true consumption of activities to avoid service-cost distortions.

The financial director of Company B was unsurprised by the statistical results and cited the same reason for the lack of a relationship between service diversity and ABC adoption (see chapter 6, sub-section 6.3.1.2). The relationship between service diversity and ABC usage may be more obvious in manufacturing industry than in non-manufacturing industry because the identification of diverse activities in non-manufacturing industry can be difficult (Alcouffe et al., 2019). Services cannot be measured, weighed, or inspected. This might explain why Baird (2007) and Baird et al. (2004) found a significant relationship between product/service diversity and ABC usage, as they included manufacturing companies in their studies.

Due the paucity of previous studies that did not test the hypothesis– and the findings seen in both the qualitative and quantitative studies – one can argue that they might be unrelated. This is the case, despite the theory which generated the hypothesis.

7.3.3.1.3 Cost structure and ABC usage

In H_5, it was suggested that cost structure would increase ABC usage. However, as reported in Table 7.11, these two variables were unrelated. The current research finding is not in line with the ABC usage studies which found a direct, positive relationship between cost structure and ABC usage in manufacturing and non-manufacturing companies (Baird, 2007; Baird et al., 2004).

Moreover, two interviewees from Company B and C were surprised at the statistical results, as they thought there would be a significant relationship between cost structure and ABC usage, as discussed in the ABC adoption model (see chapter 6, sub-section 6.3.1.3). They believed that, if companies have a high percentage of indirect costs in the cost structure, ABC can help them to identify the activities for each service provided, so that the indirect costs can be identified for each service provided and ABC can help to avoid cross-subsidisation between services. Even though services cannot be measured, ABC can help to quantify their associated costs by identifying the activities related to each specific service element provided.

A possible reason for the lack of a relationship between the two variables could be the measurement of ABC usage. It is possible that some companies have high indirect costs and do not adopt ABC, but use ABC for special circumstances - such as special studies - and that they opted for a small or medium extent of ABC usage rather than a large or very large extent within the questionnaire (see Table 7.12).

7.3.3.1.4 Service diversity, cost structure and ABC usage

According to H_{2b}, service diversity was hypothesised to be related with cost structure, but the results in Table 7.11 indicate that this hypothesis was rejected.[77] As for the indirect impact (H_{2c}), cost structure does not mediate the relationship between service diversity and ABC usage (see Table 7.13).

[77] The relationship between service diversity and cost structure was discussed in chapter 6, sub-section 6.3.1.4.

7.3.3.1.5 Business strategy and ABC usage

In H_{3a}, differentiation strategy was posited as a way to increase ABC usage. The result indicates that differentiation strategy is unrelated to ABC usage (see Table 7.11). The field study helped to shed more light on why differentiation strategy may still have no impact on ABC usage. For example, the interviewee from Company A believed that differentiation strategy is related to marketing and sales rather than ABC usage. In addition, another interviewee believed that, if companies use differentiation strategy, they provide unique services that are different from those of their competitors, which leads these companies to be unique in terms of something other than the pricing of services. The interviewee expressed his view as follows:

> I think your differentiation to be competitive might not be cost relevant. It might be something else so, therefore, that could just could remove the focus on costs. (Company B)

Given the field interview evidence and previous literature, there are two possible reasons for the lack of a relationship between differentiation strategy and ABC usage. The first is that the measurement of differentiation strategy is insufficient to capture the different dimensions of differentiation. In the current research, it was proposed that differentiation strategy would be measured by three items but, due to issues related to the discriminant validity, it was decided to remove one item.[78] As a consequence, further items concerning brand identification were required in order to enhance the measurement of differentiation strategy. A second possible reason is that, when companies use differentiation strategy, they rarely do not face pressure to reduce their costs, meaning that they may not use ABC since they are not particularly keen on understanding the process of their activities. This explanation is consistent with the argument found in prior studies (Chenhall and Langfield-Smith, 1998; Drury and Tayles, 2005; Malmi, 1999).

[78] The discriminant validity was discussed in chapter 5, sub-section 5.4.4.1.

Additionally, H_4 suggested that a cost leadership strategy would be related negatively with ABC usage, and the results in Table 7.11 indicate that this hypothesis was rejected. The current research finding did not differ from the prior ABC usage studies that failed to find a relationship between a defender strategy (cost leadership strategy) and ABC usage (Gosselin, 1997). The field study helped to shed more light on why cost leadership strategy may still have no impact on ABC usage. The management accountant from Company C assumed that the strategies are laid out at a very high level, so they do not impact on the actual service costs. In addition, another interviewee from Company A believed that cost leadership arises when companies tend to provide the lowest cost for services and the costs of using ABC can exceed the benefits of using it.

Conversely, one interviewee from Company B was of the belief that the implementation of a cost leadership strategy would probably lead to a rise in ABC usage. This was based on the view that companies adopting this strategic approach tend also to use ABC as it can help with structuring their costs. Therefore, ABC, used in combination with a cost leadership strategy, can aid the identification and review of various activities that comprise the services. As a result, companies can introduce measures to decrease their non-value and/or redundant activities in order to reduce the associated service costs, thus improving their overall financial performance. Drury and Tayles (2005) concurred with this analysis, highlighting the importance of employing more complex costing systems, for example, ABC, particularly for companies that implement cost leadership and differentiation strategies.

7.3.3.1.6 Differentiation strategy, service diversity and ABC usage

H_{3b} posited that a direct, positive relationship would exist between differentiation strategy and service diversity, and Table 7.11 confirms this ($\beta = 0.85$, $p \leq 0.001$).[79] As previously noted, this study did not report a relationship between ABC usage and service diversity. In terms of the indirect effect (H_{3c}), the current research found that service diversity does not mediate the relationship between differentiation strategy and ABC usage.

7.3.3.1.7 Differentiation strategy, cost structure and ABC usage

H_{3d} suggested that differentiation strategy is related to the cost structure in a positive way, and this was confirmed by the results in Table 7.11 ($\beta = 0.52$, $p \leq 0.001$).[80] As previously noted, no relationship was identified between cost structure and ABC usage. In terms of the indirect effect, and as shown in Table 7.13, cost structure does not mediate the relationship between differentiation strategy and ABC usage.

7.3.3.1.8 Differentiation strategy and service quality in the ABC usage model

Although the link between differentiation strategy and service quality was not hypothesised originally, the initial expectations were that this link would be positive. The path between differentiation strategy and service quality was included in the ABC usage structural model for the purpose of increasing the model fit. Table 7.11 indicates that a positive relationship existed between differentiation strategy and service quality ($\beta = 0.81$, $p \leq 0.001$).[81]

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[79] The relationship between differentiation strategy and service diversity was discussed in chapter 6, sub-section 6.3.1.6.
[80] The relationship between differentiation strategy and cost structure was discussed in chapter 6, sub-section 6.3.1.7.
[81] The relationship between differentiation strategy and improved service quality was discussed in chapter 6, sub-section 6.3.1.8.

7.3.3.1.9 Size of business unit and ABC usage

H_6 posited that firm size is related to ABC usage in a positive way. However, the results indicate that no significant relationship existed between the two variables (Table 7.11). This finding is consistent with Baird et al.'s (2004) study, which found that the size of an organisation, as measured by the number of employees, did not influence ABC usage in Australian private manufacturing and non-manufacturing companies. The results of the current study, however, contradict those of another ABC usage study, which found a significant relationship between size, as measured by the number of employees, and ABC usage in Australian public manufacturing and service companies (Baird, 2007). "[T]he adoption of the highest level of activity management (ABC) is related to the ability of public sector organisations to commit resources to the development and implementation of the practice, with larger more resource-intensive-based organisations [being] more likely to adopt ABC" (Baird, 2007, p. 565).[82]

The interviewees' opinions were sought to explain why an association was not found between size and ABC usage. The feedback obtained from all of the respondents was that company size generally did not influence ABC usage. Instead, they identified other determinants, particularly financial resources and top management support, as being more likely to shape this decision. These aspects will be discussed in greater detail in in sub-section 7.3.3.3 and section 8.4.

7.3.3.2 Second research objective: to examine the indirect influence of ABC usage on financial performance through non-financial performance factors

Most of the previous research found that there is no relationship between the extent of use ABC and financial performance (Maiga and Jacobs, 2008). As a result, the current research aims to test the mediation role of non-financial performance between ABC usage and financial

[82] This can be not true in the UK public companies. In recent years, resources have been cut from the UK public sector, which would reduce the likelihood of the adoption and use of ABC (Hood and Dixon, 2013).

performance. The direct relationship between ABC usage and financial performance was not hypothesised, but the direct link between the two variables was added to compare the results between the direct and indirect relationships. The indirect relationship will be discussed below. For the direct relationship, the study found that ABC usage has no relationship with financial performance. To the author's knowledge, no existing studies have tested the relationship between ABC usage and financial performance.

The interviewees were surprised at the statistical results because they thought that there existed a direct, positive relationship between ABC usage and financial performance. However, the interviewees provided two possible reasons for the lack of a relationship between the two variables. The first is that the cost of using ABC could exceed the benefits, as the use of ABC requires people and time and companies must also have to pay for these costs. The interviewees commented:

> If you put an activity-based costing system in, and you are not careful ... recording information can take up a lot of people's time, and you can add a lot of costs to the business by doing this, and therefore the benefits will be less than the cost you put in. Depending on how advanced and how manual the process is of recording the activity-based costing, the costs could be exceed the benefits you would get by activity-based costing. (Company A)

> People are just merely not adopting the benefits that arise from that … . Either that or the cost of actually using ABC is an adverse effect. It takes so long, it costs so much for you at that level. (Company C)

The second possible reason is that the financial performance of companies could be influenced by external factors, such as macro-effects in the economy. The interviewees from Company A and B believed that macro-effects, such as Brexit, could have more of an impact on financial performance than the use of ABC. The following quotes from the interviewees explain how macro-effects in the economy have a greater influence on financial performance than the use of ABC:

> If you are putting in activity-based costing, and you see a reduction in financial performance, it might well be influenced by non-activity-based costing [factors] … which could be more to do with macro effects like the economy than with the positives that have come out of the activity-based costing. At the moment, the UK economy is probably not growing as quickly as it would normally because of the uncertainty surrounding Brexit, and therefore your financial performance might deteriorate. (Company A)

> We have seen an increase in the cost of our goods by 25% in the last three years, which is due to exchange rate fluctuations rather than activity-based [costing] or, if we had an activity-based costing system here, that would not stop the deterioration in our financial performance because the activity-based costing could not influence the foreign exchange rate. I suspect it is more to do with macro effects in the economy rather than the activity-based costing itself. (Company A)

> There are external factors outside their control … . I think we are in slightly strange times with Brexit and all that. We do not really know what impact that is having at the moment. We are living through unusual times, I think. There is a lot of instability. I think people are hesitant. … .In more recent times, we have been living through a period of high uncertainty, so I do not think people want to invest as much at the moment while there is uncertainty. (Company B)

Regarding the findings from the statistical results and the fieldwork, it is possible that there is no direct relationship between ABC usage and financial performance for two reasons: the first is that the cost of using ABC could exceed the benefits. The second possible factor is that financial performance can be more affected by macro-effects in the economy than by ABC usage. Moreover, prior studies revealed that companies using ABC will be more likely to benefit from non-financial performance factors, such as the reduced costs and service cycle time, which would ultimately and indirectly improve their financial performance (Maiga and Jacobs, 2007).

7.3.3.2.1 ABC usage, service quality and financial performance

Table 7.11 indicates that ABC usage and service quality were unrelated. In terms of the insignificant effect of ABC usage on service quality as detailed in the existing study, there are a number of key explanations. First, the impact of differentiation strategy on service quality may override the impact of ABC usage on the quality of the services.[83] This can be attributed to an excessively high standardised coefficient between service quality and differentiation

[83] There is a significant and direct relationship between ABC usage and service quality, excluding the differentiation strategy ($\beta = 0.65$, $p \leq 0.001$).

strategy ($\beta = 0.81$, $p \leq 0.001$). The original ABC usage model did not propose the hypotheses associated with differentiation strategy and service quality. However, to improve the model fit, as detailed in sub-section 7.3.3, it was included in the original ABC usage model.

Second, the non-significant result could potentially be attributed to the use of ABC as a means of improving non-financial performance. Companies that have used ABC tend to emphasise other non-financial performance factors, including reduced costs. The current research found that cost reduction fully mediates the relationship between ABC usage and financial performance (see sub-section 7.3.3.2.6).

The third possible reason for the non-significant finding is that companies had an opportunity to improve their service quality during the early usage stage of ABC. By understanding the valued-added and non-value-added activities, it became difficult for them to identify the additional benefits arising from ABC usage, in terms of service quality. For example, several companies identify that poor services or services with lower standards of quality are at risk of elimination from the overall service portfolio during the early stages of ABC usage. Nonetheless, constantly identifying and eliminating poor services may not be a beneficial strategy, as it could lead to a limited range of services. Alternatively, when using ABC, some companies may decide to reduce their cost and service cycle time. A strategy of this nature can potentially help companies to retain their service pricing alongside their competitors. At the same time, having reduced the service costs and cycle time, the financial performance may improve, especially in light of the continued improvements across other non-financial performance factors.

In addition, the field study helped to shed more light on why ABC usage may still have no impact on service quality. All of the interviewees believed that ABC usage is not linked to service quality for two reasons. The first is that service quality is affected by the business unit strategy rather than the costing system. In addition, service quality for the delivery of services is driven by customer services, rather than ABC. The interviewees commented:

> There are more things surrounding the quality of the service than just cost drivers … .There is more to providing a good quality service than an activity cost model. (Company A)

> Your service is obviously coming out of your strategies, rather than specifically out of your cost base so there is obviously not a direct correlation between the two. So your service quality is based on your strategy no matter what your cost usage is. (Company C)

> I think that is delivered more by what is happening with non-financial parameters, like how quickly you deliver goods, what your customer service is like … , rather than having a financial value. (Company A)

Based on the above discussion of the non-significant effect of ABC usage on service quality, it seems that the surveyed companies in the current research may have improved their service quality due to the influence of the business strategy, rather than ABC usage. In addition, they may have improved the service quality at an early stage of cost system use and then shifted their focus to reducing costs and the service cycle time.

In addition, the results also indicate that service quality is significantly and positively linked to increased financial performance ($\beta = 0.39$, $p \leq 0.001$).[84] As for the other hypothesis, the results of the mediation analysis, presented in Table 7.13, indicate that service quality does not mediate the relationship between ABC adoption and financial performance.

7.3.3.2.2 Service quality and service cycle time reduction in the ABC usage model

H_{7c} suggested that service quality is related positively to service cycle time reduction. The results in Table 7.11 confirm the hypothesis ($\beta = 0.48$, $p \leq 0.001$).[85]

[84] The relationship between service quality and financial performance was discussed in chapter 6, sub-section 6.3.2.1.

[85] The relationship between service quality and service cycle time reduction was discussed in chapter 6, sub-section 6.3.2.2.

7.3.3.2.3 Service quality and cost reduction in the ABC usage model

H_{7d} hypothesised that service quality would be negatively related to cost reduction. The results in Table 7.11 confirm the hypothesis (β = -0.20, $p \leq 0.05$).[86] The hypothesis that relates to service quality and cost reduction was assumed to be negative for the three usages of AM. However, while this hypothesis was rejected for AA usage and ACA usage, it was supported for ABC usage. A possible reason for the conflicting results could be the influence of ABC usage on cost and service cycle time reduction. It appears that AA usage and ACA usage did not influence the three non-financial performance factors. Conversely, ABC usage had a negative and direct relationship with cost reduction.

7.3.3.2.4 ABC usage, service cycle time reduction and financial performance

H_{8a} of the ABC usage model posited that a positive, direct relationship exists between ABC usage and reduced service cycle time. It is noteworthy that the results in Table 7.11 confirm this hypothesis (β = 0.35, $p \leq 0.001$). This finding does not differ from that of other studies, but these studies used ABC adoption rather than ABC usage and found a significant relationship between ABC adoption and reduced product cycle time (Fei and Isa, 2010; Ittner et al., 2002). Overall, ABC usage can help companies to minimise the delays to their services by providing information concerning these non-value-added activities, thus allowing them to be minimised.

In addition, the field interviews revealed views that support the applicability of ABC usage for reducing the service cycle time. All of the interviewees agreed with the statistical results and believed that, if companies use ABC, they will understand their costs, which will lead them to

[86] The relationship between service quality and cost reduction was discussed in chapter 6, sub-section 6.3.2.3.

reduce their time and costs as the company's value and non-value-added activities will be known. The following are examples of the interviewees' statements:

> If you are understanding your cost drivers, then you can probably improve them significantly, … and the same with [services cycle time reduction and] cost reduction as well, because if you are getting the right information out, and then you are acting on it. (Company A)
>
> I am guessing that is being measured very specifically, you can see your usage and therefore you can have an effect on [service cycle time reduction], and ditto with cost reduction. (Company C)

Additionally, Table 7.11 indicates that service cycle time reduction was unrelated to financial performance.[87] In terms of the indirect effect, H_{8b} posited that service cycle time reduction does not mediate the relationship between ABC usage and financial performance.

7.3.3.2.5 Service cycle time reduction and cost reduction in the ABC usage model

A positive relationship was hypothesised between service cycle time reduction and cost reduction (H_{8c}), and the results in Table 7.11 confirm this hypothesis ($\beta = 0.67$, $p \leq 0.001$).[88]

7.3.3.2.6 ABC usage, cost reduction and financial performance

H_{9a} was established based on the expectation that a positive, direct relationship exists between ABC usage and cost reduction. Table 7.11 confirms this hypothesis ($\beta = 0.32$, $p \leq 0.001$). This is exploratory research and, to the author's knowledge, no previous literature has tested the influence of ABC usage on cost reduction, as most of it has focused on ABC adoption rather than ABC usage. Anderson and Young (1999) and Ittner et al. (2002) stated that ABC provides information about value-added and non-value-added activities, including the costs associated with them. Thus, removing non-value-added activities results in reduced costs. All of the interviewees agreed with the statistics results and believed that, if companies use ABC, they

[87] The relationship between service cycle time reduction and financial performance was discussed in chapter 6, sub-section 6.3.2.4.
[88] The relationship between service cycle time reduction and cost reduction was discussed in chapter 6, sub-section 6.3.2.5.

will understand their costs, which will lead them to reduce their costs as the company's value and non-value-added activities will be known.

In addition, Table 7.11 also indicates that cost reduction is related positively to financial performance ($\beta = 0.55$, $p \leq 0.001$).[89] As for the indirect relationship between ABC usage and financial performance through the variable of cost reduction, H_{9b} suggested that cost reduction would have a positive mediating effect on the link between ABC usage and financial performance. As shown by the mediation analysis results presented in Table 7.13, cost reduction mediates the relationship between ABC usage and financial performance ($\beta = 0.09$, $p \leq 0.01$) and the indirect effect does not include zero between the upper and lower levels of the 95% confidence interval. For this reason, it was concluded that the role of cost structure between ABC usage and financial performance is a full mediation.

[89] The relationship between cost reduction and financial performance was discussed in chapter 6, sub-section 6.3.2.6.

Table 7.13: Mediation relationships in the ABC usage model

Paths	Indirect, direct, total effect	β[a]	LLCU[b]	ULCI[c]	*p* value
Service diversity → Cost structure → ABC usage	Indirect effect	0.03	-0.03	0.21	0.34
	Direct effect	0.12	-0.76	0.81	0.70
	Total effect	0.15	-0.69	0.82	0.63
Differentiation strategy → Service diversity → ABC usage	Indirect effect	0.09	-0.62	0.62	0.69
	Direct effect	0.69	-0.18	1.87	0.13
	Total effect	0.78	0.22	1.52	0.01
Differentiation strategy → Cost structure → ABC usage	Indirect effect	0.08	-0.05	0.27	0.18
	Direct effect	0.69	-0.18	1.87	0.13
	Total effect	0.77	-0.11	1.95	0.09
ABC usage → Service quality → Financial performance	Indirect effect	0.01	-0.04	0.05	0.57
	Direct effect	-0.07	-0.17	0.01	0.10
	Total effect	-0.06	-0.16	0.03	0.21
ABC usage → Service cycle time reduction → Financial performance	Indirect effect	0.03	-0.02	0.10	0.20
	Direct effect	-0.07	-0.17	0.01	0.10
	Total effect	-0.04	-0.17	0.05	0.51
ABC usage → Cost reduction → Financial performance	Indirect effect	0.09	0.02	0.18	0.01
	Direct effect	-0.07	-0.17	0.01	0.10
	Total effect	0.02	-0.08	0.11	0.70

[a] Standardised coefficient (β).
[b] Lower limit of bootstrapped 95% confidence interval.
[c] Upper limit of bootstrapped 95% confidence interval.

7.3.3.3 Qualitative findings regarding the factors which may influence ABC usage

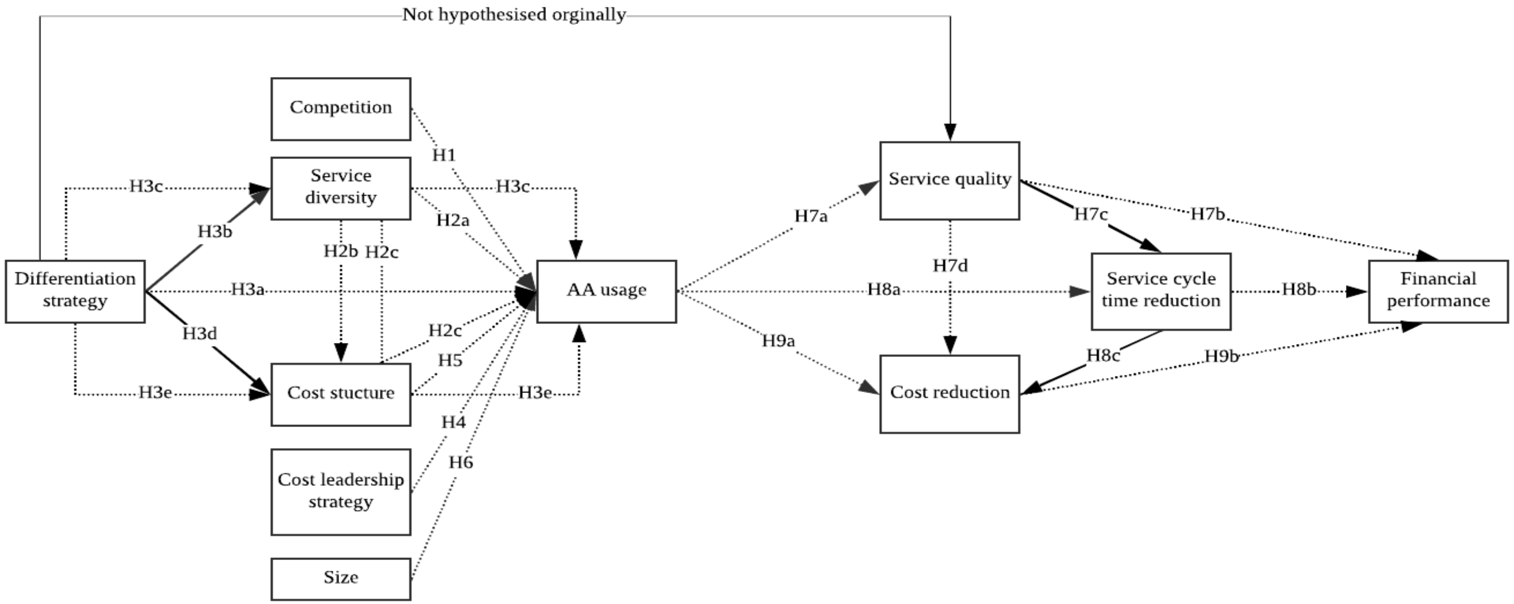
One question in the field study aimed to explore the interviewees' opinions about any possible factors that were not covered by the current study but were considered relevant in explaining ABC usage. The interviewees identified the same factors that could influence the adoption of ABC. The first factor mentioned, by the financial director from Company A, was financial resources, while the second was top management support. According to the interviewee's responses, financial resources and top management support can affect the use of costing systems, which will be discussed in chapter 8, sub-sections 8.4.2 and 8.4.3, respectively. The financial director from Company A provided an additional explanation of how top management support can influence the use of ABC.

> I suspect it is probably more to do with the culture of the business. If the culture of the business does not want to adopt activity- [based costing], then it will not happen. I would say a lot of this comes back to the culture of the organization. (Company A)
>
> If you implement an activity [-based costing system], what should happen is that some people should be able to make decisions based on that, but if the culture of the business means that somebody's being told off every time they underperform, or do not make favourable modifications to their activities, then people will not [use] the activity [-based costing]. (Company A)

7.4 Conclusion

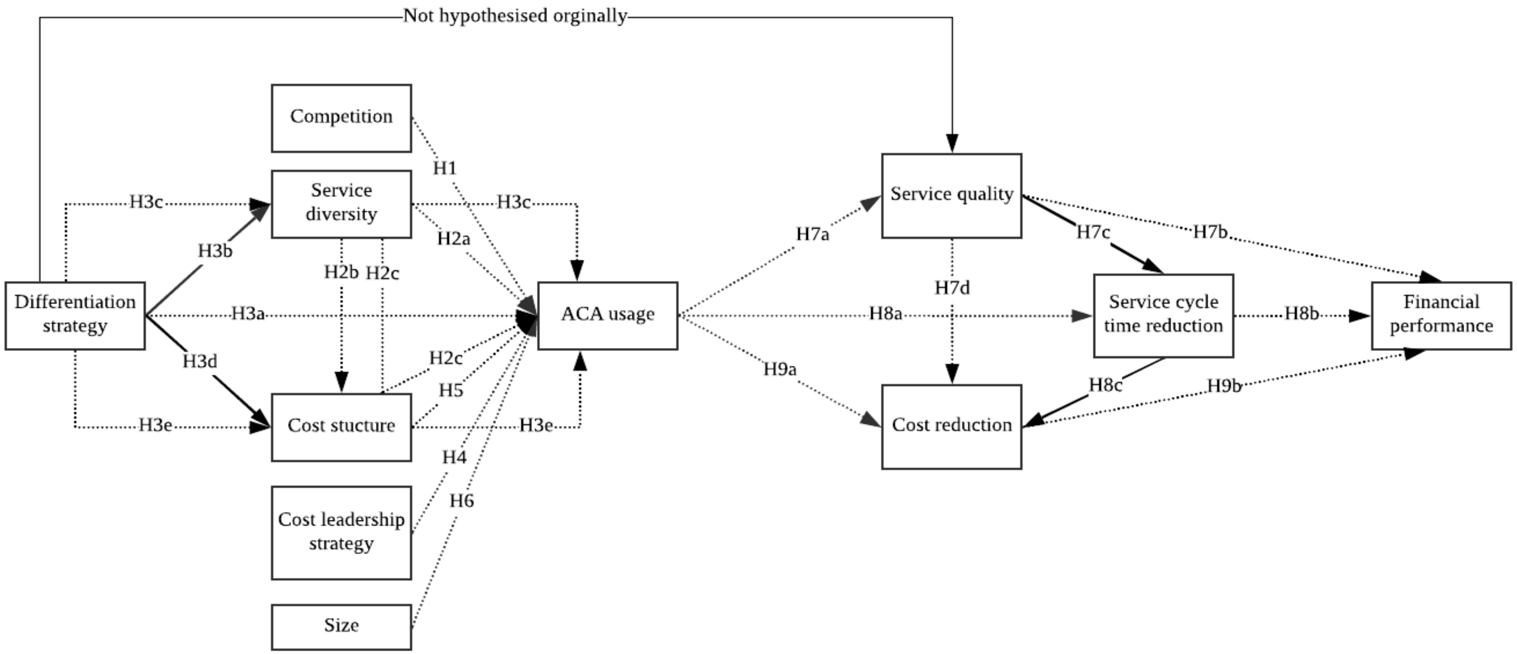
This chapter presents the descriptive statistics produced for the AM usage variables, including AA usage, ACA usage and ABC usage. In addition, this chapter discusses the quantitative and qualitative results obtained from the questionnaire and interviews, respectively. Figures 7.5 and 7.6 present the results for the hypotheses related to AA usage and ACA usage, respectively. Similar results were obtained for both models. The study found that competition, service diversity, business strategy, cost structure and size do not have a direct relationship with either AA usage or ACA usage. In addition, neither AA usage and ACA usage has a direct relationship with service quality, service cycle time reduction and cost reduction.

In addition, this chapter aimed to test the research hypotheses related to the ABC usage model. A quantitative analysis of the ABC usage model is presented in Figure 7.7. Competition had a direct and positive relationship with ABC usage; and cost reduction fully mediated the relationship between ABC usage and financial performance. The qualitative analysis endorses the quantitative results but also introduces contingent and performance factors that should be considered in future research. Having discussed the quantitative and qualitative results for AM usage models, the next chapter will discuss the structural mode findings for cost system sophistication (CSS).



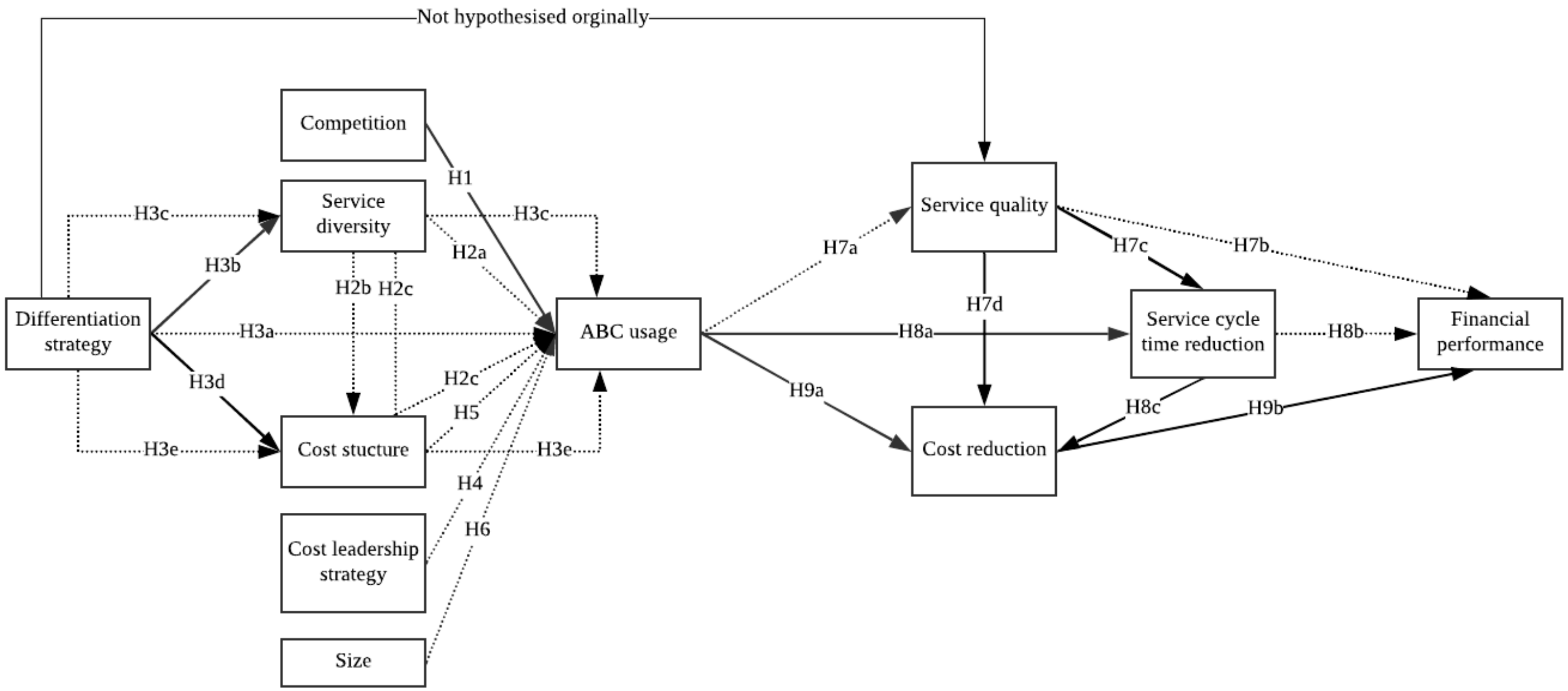
The solid lines indicate a relationship.
The dotted lines indicate no relationship.

Figure 7.5: The hypotheses results for the AA usage model



The solid lines indicate a relationship.
The dotted lines indicate no relationship

Figure 7.6: The hypotheses results for the ACA usage model



The solid lines indicate a relationship.
The dotted lines indicate no relationship

Figure 7.7: The hypotheses result for the ABC usage model

Chapter 8: Results and Discussion of the Structural Model for CSS

8.1 Introduction

This chapter presents the descriptive statistics for cost system sophistication (CSS) latent construct, tests the structural model for the CSS and examines the research hypotheses by using structural equation modelling (SEM). In addition, this chapter presents some supplementary interview results related to the CSS model. Moreover, a discussion of the quantitative and qualitative results of the CSS model is included in this chapter.

This chapter is organised as follows. Section 8.2 presents the descriptive statistics for CSS. Section 8.3 presents the results and discussion in relation to the structural model for CSS. This includes an analysis of the results relating to the hypotheses and the supplementary qualitative data. Section 8.4 focuses on the qualitative findings regarding the factors which may influence CSS. Section 8.5 provides qualitative findings regarding possible performance factors which CSS may influence. Finally, section 8.6 concludes this chapter.

8.2 Descriptive statistics for CSS[90]

The measurement of CSS applied in the previous literature has certain limitations, which were discussed in chapter 1, sub-section 1.6.2 and chapter 2, sub-section 2.2.3. In order to overcome these, the present research did not use the number of cost pools only as a measurement of CSS, nor did it exclude companies using variable costing systems (VCSs). Previous studies excluded the latter companies, instead relying on companies with more cost pools as a measurement of CSS. Criticism has been levelled at these studies, as the number of cost pools does not necessarily capture the sophistication level of the existing costing systems. In particular, some

[90] The descriptive statistics for the factors that could influence CSS and outcome variables were discussed in chapter 6, sub-sections 6.2.2 and 6.2.3.

companies may have a large number of cost pools because they have a large number of departments, a factor unrelated to costing (Al-Omiri and Drury, 2007; Ismail and Mahmoud, 2012). In addition, by including the companies using VCSs, the results will capture different experiences of costing, such as VCS, the traditional costing systems (TCSs), and CSS.

In order to address the first question of the first group ($RQ_{1/1}$), the current study reports that 49.02% (n=100) of the companies use VCSs, and 37 of them have cost pools, although the latter may be employed for purposes other than costing, such as controlling (see Appendix 10.1). These companies were not excluded from the current research analysis. However, the number of cost pools was recoded as zero, since this research focuses on testing the model in relation to the sophistication level of the costing systems rather than the systems used for other proposes. Table 8.1 presents the descriptive statistics for the CSS indicators.[91] The mean score for the cost pools is 11.37, while that for the cost drivers is 3.06, which slightly exceeds the figures for manufacturing companies. For example, Brierley (2007) examined manufacturing companies in the UK and found that the average scores for cost pools and cost drivers were 9.10 and 1.64, respectively.[92]

Table 8.1: Descriptive statistics for the CSS indicators

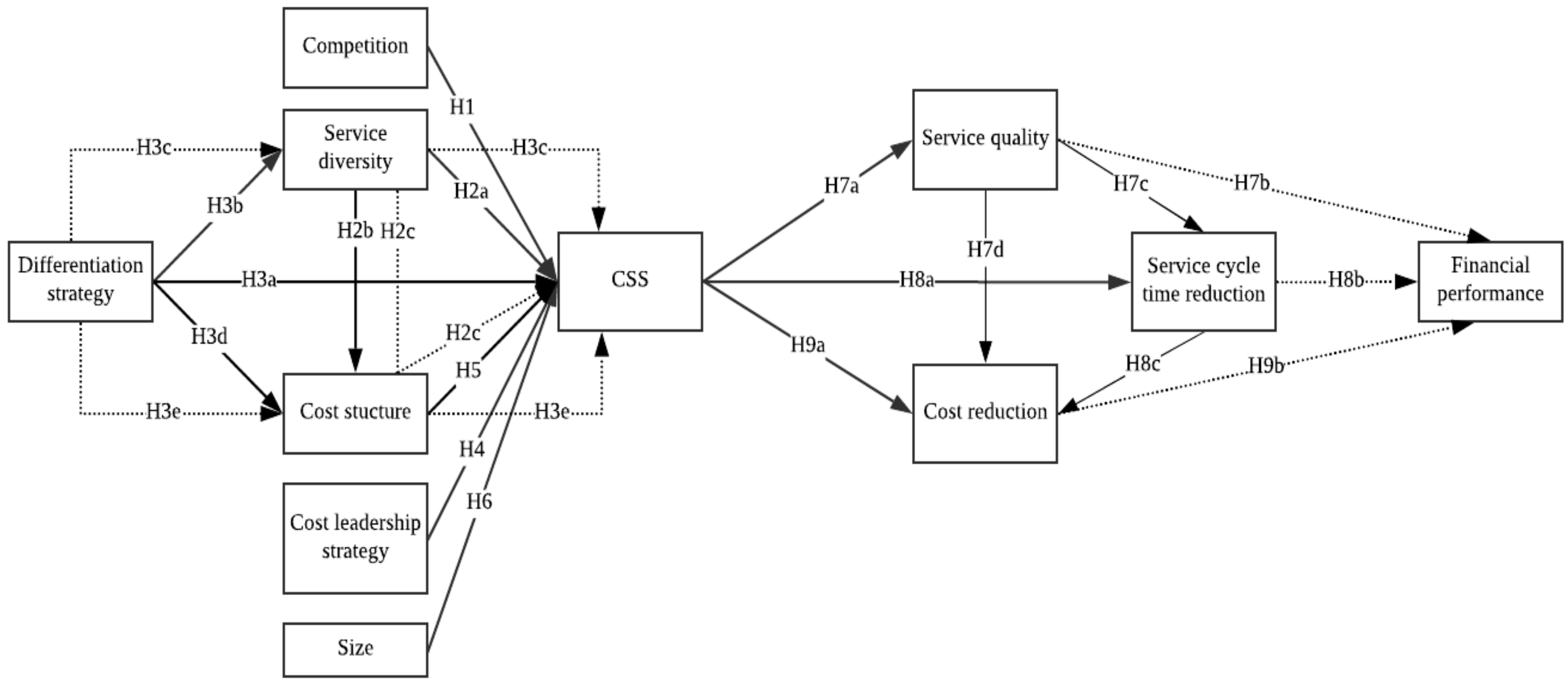
	Mean	Median	Std. Deviation	Skewness	Kurtosis
A5. Cost pools[a]	11.37	1.00	18.18	2.64	9.09
A5. Cost pools[b]	6.01	1.00	8.22	2.01	3.78
A6. Cost drivers[a]	3.06	1.00	6.58	3.04	9.80
A6. Cost drivers[b]	4.76	1.00	5.18	1.07	-0.27
A7. Volume cost drivers[a]	1.71	0.00	3.44	3.16	11.56
A7. Volume cost drivers[b]	2.91	1.00	2.95	1.15	-0.21
A8. Non-volume cost drivers[a]	1.35	0.00	3.62	3.47	12.97
A8. Non-volume cost drivers[b]	1.84	0.00	2.63	1.08	-0.43

[a] This is based on all respondents (i.e. including those using VCSs), no = 204 companies.
[b] This is based on only respondents with cost drivers (both volume and non-volume), no = 104 companies.

[91] The data presented in Table 8.1 are based on the raw data. As discussed in chapter 5, sub-section 5.2.3, the CSS indicators were transformed using Log N in order to solve the issues regarding the outlier, normality, and factor loadings. The descriptive statistics for the transformed CSS instruments are presented in Appendix 10.2.
[92] Brierley (2007) did not restrict the size of companies in the sample, which may account for the difference.

8.3 The results and discussion for the CSS model

As discussed in chapter 5, sub-section 5.4.5.2, the measurement model for CSS was acceptable in terms of meeting all of the criteria (i.e. model fit, factor loading, reliability, validity, and multicollinearity of the research latent constructs). The next step is testing the structural model for CSS, which contains two sets of hypotheses. The first set of hypotheses relates to the factors that influence CSS (H_1-H_6), which were developed to address the first group of research questions ($RQ_{1/2}$ - $RQ_{1/5}$). The second set of hypotheses relates to the influence of CSS on the outcomes, including non-financial and financial performance (H_{7a}-H_{9b}), which were developed to address the second group of research questions ($RQ_{2/1}$ – $RQ_{2/4}$) (see Figure 8.1).



The solid lines indicate a direct relationship.
The dotted lines indicate a mediation relationship.

Figure 8.1: The research hypotheses for the CSS model

Figure 8.2 presents the structural model for the CSS. The overall fit of the CSS structural model is acceptable, as shown in Table 8.2, with Chi-square $\chi^2 = 984.220$, $\chi^2/df = 2.09$, RMSEA = 0.07, $df = 472$, CFI = 0.91, IFI = 0.91, and PNFI = 0.75.

Table 8.2: Fitness indices for the CSS structural model

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 984.220$, $p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 2.09$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.07	Satisfied
	df	> 0	$df = 472$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.11	Not satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.91	Satisfied
	IFI	≥ 0.90	IFI = 0.91	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.90	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.75	Satisfied

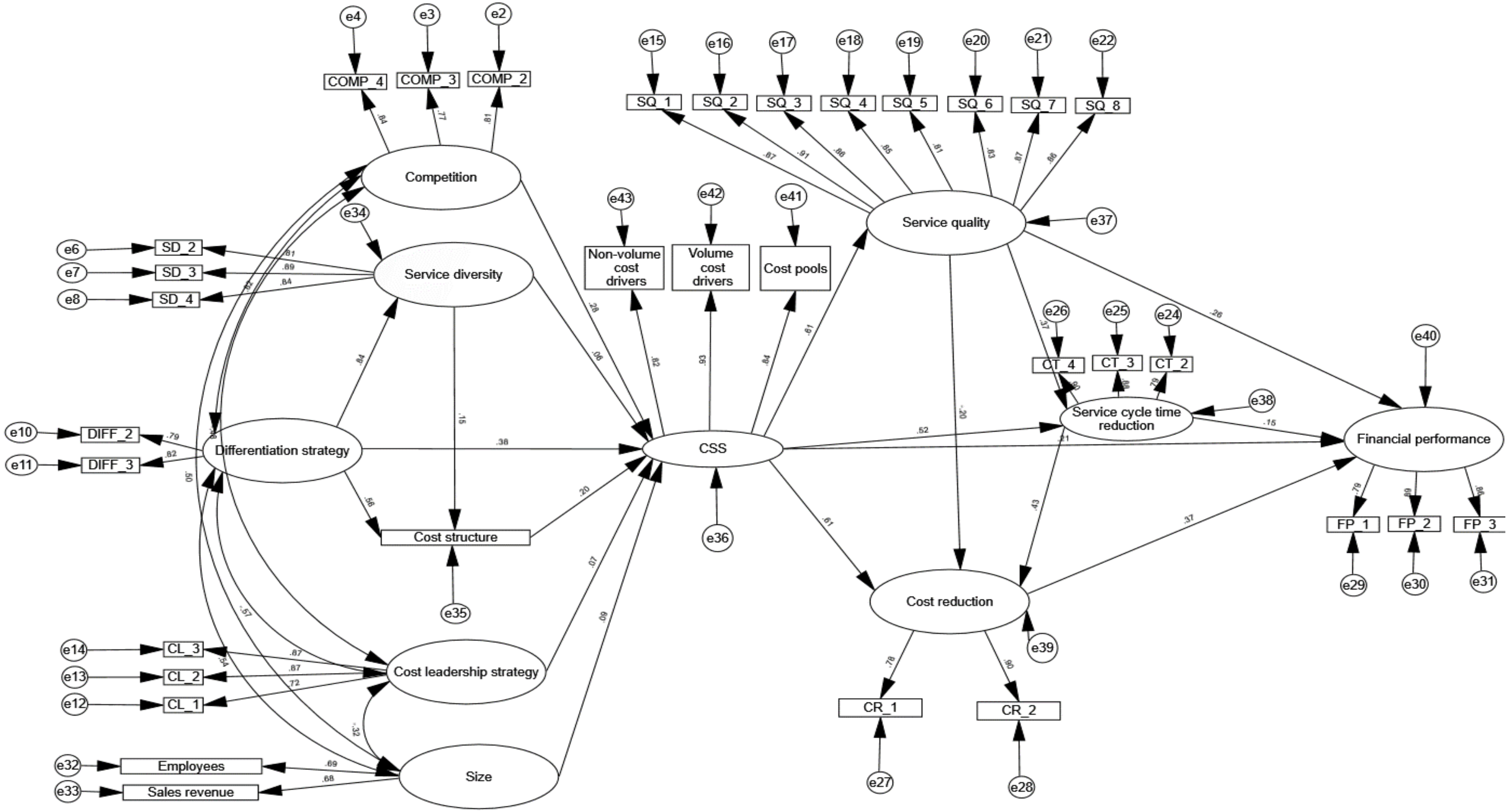


Figure 8.2: The structural model for CSS

8.3.1 First research objective: to examine the extent to which a set of contingent factors influence CSS

8.3.1.1 Competition and CSS

The first hypothesis of the CSS model (H_1) predicts a direct positive impact of competition on CSS. The current research found a positive significant relationship between competition and CSS ($\beta = 0.28, p \leq 0.01$), as reported in Table 8.3. These findings are consistent with Schoute's (2009) research, that empirically demonstrates that CSS is influenced by competition, as represented by price, product, and marketing. In addition, all of the interviewees agreed with the statistical results. They agreed that, if companies face a high level of competition in the market, they tend to use sophisticated costing systems in order to acquire a competitive advantage and make more effective decisions.[93] As in competitive settings, companies require sophisticated cost systems to ensure that revenue exceeds costs and that they are not over-or under-costing products or making poor decisions (Al-Omiri and Drury, 2007). For example, the management accountant from Company C stated:

> I imagine that, obviously, when everything comes down to it, competition is the only variable factor, and you are being pushed with the rest of your competitors. You need to step forward and make a change to differentiate yourself, so therefore you must become more sophisticated. I would think [CSS] would give them more insights, more information to enable them to make the right decisions and diversify and step away from the rest of the competitors. (Company C)

As discussed above, there is a direct relationship between competition and CSS, which was supported by both the quantitative and the supplementary interviews. However, other literature failed to find a relationship between competition and CSS (Drury and Tayles, 2005; Ismail and Mahmoud, 2012). Such sources argue that the absence of any significant relationship between competition and CSS reported in some studies was due to two possible reasons. The first is that the measurement of competition was based on one question, that may not reflect the multiple

[93] The cost system sophistication used in the current research adopts a far broader approach to analysing cost systems so that cost systems can range from a simple to a highly sophisticated costing system. CSS was measured by the number of cost pools, cost drivers, and non-volume cost drivers. This definition of CSS was presented to the interviewees.

dimensions of the variable (Drury and Tayles, 2005). "This in turn suggests that relying on unidimensional conceptualizations of competition (typically in terms of competition intensity) is suboptimal" (Holm and Ax, 2020, p. 12). However, the current research utilised superior measures with multidimensions of competition that may reflect some of Porter's (1980) forces.[94] "Such an approach could potentially also help reconcile the mixed evidence pertaining to the association between competition and [management accounting systems] MASs reported in prior management accounting" (Holm and Ax, 2020, p. 12). The second reason concerns the measurement of CSS, which was based on the composite measurement of the number of cost pools and cost drivers. This may not reflect the correct measurement of CSS, as discussed in sub-sections 1.6.2 and 2.2.3 (Al-Omiri and Drury, 2007; Drury and Tayles, 2005).

[94] The measurement of competition was discussed in chapter 4, sub-section 4.4.1.5.

Table 8.3: Summary of the results for the CSS model

Exogenous variables	Endogenous variables													
	CSS		Cost structure		Service diversity		Service quality		Service cycle time reduction		Cost reduction		Financial performance	
	β^a	*p* value	β^a	*p* value	β^a	*p* value	β^a	*p* value	β^a	*p* value	β^a	*p* value	β^a	*p* value
Competition	0.28	0.01												
Service diversity	0.06	0.59	0.15	0.27										
Cost structure	0.20	0.00												
Differentiation strategy	0.38	0.07	0.56	0.00*	0.84	0.00*								
Cost leadership strategy	0.07	0.25												
Size	0.09	0.22												
CSS							0.61	0.00*	0.52	0.00*	0.61	0.00*	0.21	0.05
Service quality									0.37	0.00*	-0.20	0.01	0.26	0.00*
Service cycle time reduction											0.43	0.00*	0.15	0.15
Cost reduction													0.37	0.00

* *p* value < 0.001 (two-tailed).

[a] Standardised coefficient (β).

8.3.1.2 Service diversity and CSS

High service diversity was hypothesised in H_{2a} as positively increasing the level of CSS. The finding points to the fact that service diversity has no association with CSS, as reported in Table 8.3. The results of this research differ from the findings of earlier CSS studies, which found a significant relationship between product/service diversity and CSS in manufacturing and non-manufacturing industries (Drury and Tayles, 2005; Schoute, 2009). On the other hand, the results of this research do not differ from the result of earlier CSS studies, which failed to find a significant relationship between product/service diversity and CSS in manufacturing and non-manufacturing industries (Al-Omiri and Drury, 2007). When the interviewees in the current research were questioned about the underlying reasons for the absence of any relationship between service diversity and CSS, the interviewees form Company A and C expressed an overall lack of surprise regarding this finding, attributing it to the fact that costing remains unaffected when companies decide to diversify their services. The following quotation is an example of the interviewees' opinions:

> I assume that you have a service [diversity] which is outside your cost system. You do not need to have a sophisticated cost system to diversity your service base maybe. (Company C)

8.3.1.3 Cost structure and CSS

A high percentage of indirect costs in the cost structure was hypothesised in H_5 as positively increasing the level of CSS. The result of the current study found a positive and significant relationship between cost structure and CSS ($\beta = 0.20$, $p \leq 0.00$), as presented in Table 8.3. This is consistent with the argument that business units that have high overhead costs tend to use CSS in order to track the varying consumption of overhead costs by different services. Consequently, CSS will help businesses to capture accurately the cost of services and avoid cross-subsidisation between services (Cagwin and Bouwman, 2002; Cooper and Kaplan, 1992).

The results of the current study conflict with those of other CSS studies which fail to find a significant relationship between cost structure and CSS (Al-Omiri and Drury, 2007; Drury and Tayles, 2005; Ismail and Mahmoud, 2012). There are two possible reasons why the previous CSS studies were unable to find a relationship. The first is that the majority of CSS studies included manufacturing and non-manufacturing companies and, therefore, encompassed heterogeneous sectors (Al-Omiri and Drury, 2007; Drury and Tayles, 2005). In comparison to non-manufacturing companies, manufacturing companies tend to have a lower proportion of indirect costs, due to them having higher material costs. The second possible reason, again, is that the measurement of CSS is inadequate because it is based on the composite measurement of cost pools and cost drivers. This may not be reflective of correct CSS measurements (Al-Omiri and Drury, 2007; Drury and Tayles, 2005).

The interviewees were questioned about the possible reasons underlying the significant relationship between the two variables. All of the interviewees concurred with the quantitative result and they believed that when there are high indirect costs, companies require a sophisticated cost system which can analyse these costs and then allocate them appropriately to each service. The interviewees commented as follows:

> I would have thought it is more relevant as a high indirect [cost] because, the higher the direct costs, they are almost easier to identify, so where it gets more complicated is where there is a higher indirect cost, so I would have thought it would require more sophistication in a way. (Company B)

> You are going to get out what you put in, so the more you can review your overhead base, then you are going to be prepared to spend more and refine your system to analyse what you have. (Company C)

8.3.1.4 Service diversity, cost structure and CSS

As stated in H_{2b}, it is expected that service diversity is related positively with cost structure. The results in Table 8.3 reveal that service diversity is not associated with cost structure.[95] Regarding the indirect effect, H_{2c} specifies that cost structure will positively mediate the relationship between service diversity and CSS. The results of the mediation analysis are reported in Table 8.4 below. As shown in the table, cost structure does not mediate the relationship between service diversity and CSS.

8.3.1.5 Business strategy and CSS

A differentiation strategy was hypothesised in H_{3a} as positively increasing the level of CSS. A sophisticated costing system with a high number of cost pools, volume and non-volume cost drivers helps to manage the cost levels and increases a company's understanding of the value-added activities that enhance the differentiation of its services/products (Schoute, 2009). However, the result of the current research points to the fact that differentiation strategy has no association with CSS, as reported in Table 8.3. The results of this research differ from an existing CSS study which finds a significant relationship between business strategy and CSS (Schoute, 2009). The finding was unsurprising to two interviewees (Company A and B), who mentioned the same reasons which were discussed in the previous chapter about AM usage from the ABC usage model (sub-section 7.3.3.1.5). The interviewee from Company A believed that differentiation strategy is related to marketing and sales rather than the level of CSS. In addition, another interviewee from Company B believed that, if companies use the differentiation strategy, they provide unique services that are different from those of their competitors, which leads these companies to be unique in terms of something other than the costing of their services. On the other hand, another interviewee from Company C expressed

[95] The relationship between service diversity and cost structure was discussed in chapter 6, sub-section 6.3.1.4.

surprise regarding the hypothesis results and indicated that they had assumed there would exist a significant and direct relationship between the two variables. The management accountant from Company C commented:

> I am surprised that the strategies do not impact more. I would expect a business strategy to impact directly on their adoption of a cost system [sophisticated costing system]. (Company C)

Given the results of the current field interviews and existing research in this area, one possible reason why no relationship can be identified between differentiation strategy and CSS is that the measurement of the differentiation strategy used in the current research is inherently weak. This is because it includes two items instead of three.[96] In comparison, Schoute's (2009) research employs six items to measure business strategies.

In addition, cost leadership strategy was hypothesised in H_4 as being negatively related with CSS. The findings point to the fact that the cost leadership strategy has no association with CSS, as reported in Table 8.3. The lack of an association between the cost leadership strategy and CSS found in this study concurs with earlier evidence reported by the ABC research rather than that related to CSS (Elhamma and Fei, 2013; Malmi, 1999). Companies adopting a cost leadership strategy reported that they understood the structure of their costs and so may not need a sophisticated costing system. The field study helped to shed more light on why cost leadership strategy may still have no impact on CSS. The financial director from Company A explained the lack of a relationship between the two variables as follows:

> I think you can have good cost leadership, but you do not necessarily have to have really enhanced cost system sophistication. I do not know if you have heard of ... I think it is Pareto, the 80/20 rule. (Company A)

[96] The measurement of differentiation strategy used in the current research was proposed to have three items. However, there was an issue related to the discriminate validity, so it was decided to remove one item, see sub-section 5.4.5.1.

On the other hand, one interviewee form Company B argued that a cost leadership strategy is more likely to increase the level of CSS. The interviewee in Company B asserted that, if companies use cost leadership strategies, they focus more both on costs and on the ways to eliminate them. Consequently, CSS may help them in order to understand the activity processes and avoid under or over costing services. This is consistent with Drury and Tayles (2005), who argue that the sophistication of costing systems might be critical for companies using cost leadership strategies and differentiation strategies.

8.3.1.6 Differentiation strategy, service diversity and CSS

As stated in H_{3b}, it is expected that differentiation strategy is related positively with service diversity. The results in Table 8.3 reveal that differentiation strategy is positively related with service diversity ($\beta = 0.84$, $p \leq 0.001$).[97] As discussed in sub-section 8.3.1.2, the result of the current study found no relationship between service diversity and CSS. Regarding the indirect effect, H_{3c} specifies that service diversity will positively mediate the relationship between differentiation strategy and CSS. The results of the mediation analysis are reported in Table 8.4 below. As shown in the table, service diversity does not mediate the relationship between differentiation strategy and CSS.

8.3.1.7 Differentiation strategy, cost structure and CSS

As stated in H_{3d}, it is expected that differentiation strategy is related positively with the cost structure. The results in Table 8.3 reveal that differentiation strategy is positively related with the cost structure ($\beta = 0.56$, $p \leq 0.001$).[98] As discussed in sub-section 8.3.1.3, the current study found a direct, positive relationship between cost structure and CSS. Regarding the indirect

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[97] The relationship between differentiation strategy and service diversity was discussed in chapter 6, sub-section 6.3.1.6.

[98] The relationship between differentiation strategy and cost structure was discussed in chapter 6, sub-section 6.3.1.7.

effect, H_{3e} specifies that the cost structure will positively mediate the relationship between differentiation strategy and CSS. The results of the mediation analysis are reported in Table 8.4 below. As shown in the table, the cost structure mediates the relationship between the differentiation strategy and CSS ($\beta = 0.07$, $p \leq 0.01$), and the indirect effect did not include zero between the lower and upper levels of the 95% confidence interval. Consequently, the role of cost structure between differentiation strategy and CSS is full mediation, as there is no direct association between differentiation strategy and CSS.

8.3.1.8 Size of the business unit and CSS

As indicated in H_6, organisational size is expected to be positively related to CSS. The finding from the analysis shows that no significant relationship exists between size and CSS, as reported in Table 8.3. The current findings are consistent with Ismail and Mahmoud's (2012) study, which concluded that organisational size, as measured by the number of employees, did not influence CSS in manufacturing companies. However, these results conflict with those emerging from the CSS studies which detected a significant relationship between size, as determined by the number of employees (Schoute, 2009), and sales revenue (Al-Omiri and Drury, 2007; Drury and Tayles, 2005).

All three of the interviewees were unsurprised at the statistical results because they had not considered that any relationship existed between business unit size and CSS. However, the complexity of the services can generate direct, significant relationships with CSS, as justified by the interviewee from Company A who believed that no relationship exists between size and CSS:

> I think you can be a small company and still be quite sophisticated in your costing techniques, but you do not have to, because you can do the same things as a small company as a large company. It is just probably the quantum of the numbers that you do. I think you can be any size and you can still do the same. You could be very sophisticated in a big company, or you could just have a smallish [company]. Depends on the complexity of probably the product and service you are supplying. You do not have to be sophisticated, if you have a very simple business. Maybe some companies are large, but they provide very simple products and services, and therefore they do not need to be sophisticated, whereas you could have a smallish company that supplies quite a number of [complex] services and products, and therefore would probably want a good [sophisticated] cost system. (Company A)

There are various ways in which the concept of complexity can be defined in respect of the services, with the precise manner depending upon the specific focus in question (Kreye et al., 2015). Benedettini and Neely's (2012a, 2012b) review of the relevant literature in this field identified two areas of service complexity; namely: complicatedness and difficulty. The former denotes the presence of multiple components with connections to service provision, while the latter, conversely, signifies the elevated number of resources required to accomplish the desired result. Thus, whilst a complicated service incorporates multiple functions, a difficult service conveys multifaceted functionality (Benedettini and Neely, 2012a, 2012b). According to Benedettini and Neely (2012a, 2012b), there are 76 potential factors that enable a distinction to be made between a complex, simple service across multiple dimensions, as follows: (1) markets and products, (2) technologies, (3) production processes, (4) administration and management, and (5) the ecosystem.[99]

In addition, the management accountant from company C believed that the financial resources of companies can affect the level of CSS, which will be discussed below in sub-section 8.4.2. The interviewees believed that that the non-significant relationship between organisational size and CSS is potentially a consequence of these dependent variables affected by the financial resources, as opposed to either the number of employees or sales revenue. As a consequence of using sophisticated costing systems, significant implementation costs are incurred (Kaplan

[99] The complexity of service is one of the potential contingent factors that can affect CSS. The implications of this factor on this research will be discussed further in sub-section 8.4.1 and section 9.7.

and Cooper, 1998). This requires companies to allocate financial resources to cover this investment. It is possible for a company to have a high level of sales whilst simultaneously possessing minimal cash resources or a scant ability to attract loan financing to invest in a sophisticated costing system. The interviewee stated:

> Larger companies have the power and financial backing to be able to have a more sophisticated cost system. (Company C)

Based on the quantitative and qualitative results, two possible reasons may explain why the current research fails to find any direct relationship between size and CSS. The first is that CSS is more likely to be affected by the complexity of the services provided than by either the number of employees or sales revenue. The second possible reason is that CSS is more likely to be affected by the financial resources available for investment rather than by either the number of employees or sales revenue.

8.3.2 Second research objective: to examine the indirect influence of CSS on financial performance through non-financial performance factors

8.3.2.1 CSS, service quality and financial performance

Hypothesis H_{7a} of the CSS model specifies a positive, direct relationship between CSS and service quality. The results in Table 8.3 reveal that CSS is significantly and positively related to service quality ($\beta = 0.61, p \leq 0.001$). The current research results accord with those emerging from Ismail and Mahmoud's (2012) study, which argues that CSS can provide highly accurate cost information. In addition, the interviewees' arguments support the quantitative results. Specifically, CSS can help companies to understand their costs and identify non-contributory activities or poor-quality products/services resulting from poor decision-making. The interviewees expressed their thoughts as follows:

> If you have got an unsophisticated costing system, to put in a new service or improve your service, you are taking a big risk if you do not fully understand your costs, whereas if you [have] got a very sophisticated system, then by implementing new services or improving your quality of services, that might add costs to the business. (Company A)

> You are getting that information out. You can see what your service levels are and, therefore, put steps in place to improve them, which in turn will drive your financial performance. (Company C)

Table 8.3 also shows that service quality is positively and significantly related to financial performance ($\beta = 0.26$, $p \leq 0.001$).[100] The research found that there is a significant, direct relationship between CSS and financial performance ($\beta = 0.21$, $p \leq 0.05$). To the author's knowledge, most previous studies in this field have focused on the influence of ABC adoption on financial performance rather than the impact of CSS. The majority of these studies failed to establish a relationship between the two variables (Cagwin and Bouwman, 2002; Ittner et al., 2002; Maiga and Jacobs, 2007). Moreover, it is possible that the different measurements adopted in relation to ABC and CSS can explain the different results. CSS employs a far broader approach to the analysis of cost systems. Hence, the cost systems investigated can range from simple costing systems to highly sophisticated ones (Al-Omiri and Drury, 2007; Drury and Tayles, 2005). Companies use sophisticated costing systems with a high numbers of cost pools, and volume and non-volume cost drivers, that may render their costs more visible by analysing and identifying which specific activities consume resources. Thus, CSS is superior to ABC adoption as a measure of the cost system as the current research was able to find a direct relationship between CSS and financial performance.

The field interviews incorporated within the study produced views which confirm the applicability of sophisticated costing systems with a high number of cost pools, volume cost drivers and non-volume cost drivers for improving financial performance. The interviewees

[100] The relationship between service quality and financial performance was discussed in chapter 6, sub-section 6.3.2.1.

agreed with the quantitative findings. They argued that if companies use a sophisticated costing system, it may generate good quality information and result in enhanced financial performance. For example, the financial director in Company A expressed his opinions thus:

> I think, if you have got the right information coming out of your [sophisticated] cost systems, then you can improve the whole of the business, and you can have a lot of data come out…If you have got a proper [sophisticated] cost system that can give you a lot of detail, then you can always improve your financial performance. (Company A)

Regarding the indirect effect, H_{7b} specifies that service quality positively mediates the relationship between CSS and financial performance. The results of the mediation analysis are reported in Table 8.4 below. As shown in the table, service quality mediates the relationship between CSS and financial performance ($\beta = 0.21$, $p \leq 0.01$), and the indirect effect did not include zero between the lower and upper levels of the 95% confidence interval. Consequently, the ability of service quality to perform a mediating role between CSS and financial performance results in partial mediation. This is because there is a direct relationship between CSS and financial performance, as discussed above.

8.3.2.2 Service quality and service cycle time reduction in the CSS model

As indicated in H_{7c}, service quality is expected to be positively related to service cycle time reduction. The finding from the analysis shows that a positive significant relationship exists between service quality and service cycle time reduction ($\beta = 0.37$, $p \leq 0.001$), as reported in Table 8.3.[101]

[101] The relationship between service quality and service cycle time reduction was discussed in chapter 6, sub-section 6.3.2.2.

8.3.2.3 Service quality and cost reduction in the CSS model

Service quality was hypothesised in H_{7d} as having a negative relationship with cost reduction. This finding suggests that service quality has a negative relationship with cost reduction (β = -0.20, $p \leq 0.05$), as reported in Table 8.3.[102]

8.3.2.4 CSS, service cycle time reduction and financial performance

Hypothesis H_{8a} of the CSS model specifies a positive, direct relationship between CSS and service cycle time reduction. The results in Table 8.3 reveal that CSS has a positive association with service cycle time reduction (β = 0.52, $p \leq 0.001$). These results accord with the findings of previous research. However, those studies which used ABC, rather than CSS, identified a significant relationship between ABC adoption and reductions in the product cycle times (Fei and Isa, 2010; Ittner et al., 2002). CSS with a number of cost pools, coupled with both volume and non-volume cost drivers, can help companies to minimise delays through the provision of additional information about value-added and non-value-added activities. This allows them to be minimised within the service cycle time reduction.

The field interviews reveal opinions which support the applicability of CSS in reducing the service cycle time. All of the interviewees agreed with the hypothesis results because they believe that, when companies use CSS, they will acquire a more profound comprehension of their costs and value activities. CSS can also help companies to eliminate non-value-added activities.

Table 8.3 also shows that service cycle time reduction has no association with financial performance.[103] Regarding the indirect effect, H_{8b} specifies that service cycle time reduction

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[102] The relationship between service quality and cost reduction was discussed in chapter 6, sub-section 6.3.2.3.

[103] The relationship between service cycle time reduction and financial performance was discussed in chapter 6, sub-section 6.3.2.4.

will positively mediate the relationship between CSS and financial performance. The results of the mediation analysis are reported in Table 8.4 below. As shown in the table, service cycle time reduction does not mediate the relationship between CSS and financial performance.

8.3.2.5 Service cycle time reduction and cost reduction in the CSS model

As indicated in H_{8c}, service cycle time reduction is expected to be positively related to cost reduction. The findings of the analysis show that a positive significant relationship exists between service cycle time reduction and cost reduction ($\beta = 0.43$, $p \leq 0.001$), as reported in Table 8.3.[104]

8.3.2.6 CSS, cost reduction and financial performance

Hypothesis H_{9a} of the CSS model specifies a positive, direct relationship between CSS and cost reduction. The results in Table 8.3 reveal that CSS has a positive association with cost reduction ($\beta = 0.61$, $p \leq 0.001$). To the best of the author's knowledge, there are no studies which have specifically tested the influence of CSS on cost reduction. However, the prior research reported that the success of ABC assisted in reducing costs (Anderson and Young, 1999; Ittner et al., 2002). The importance of reducing costs generates a tendency to use sophisticated costing systems, such as ABC, as a way of targeting and removing non-value-added activities that can be used as non-financial performance measures to monitor the effectiveness of the activity performance of the business units (Ittner et al., 2002; Kaplan and Cooper, 1998; Shields, 1995). Therefore, companies with sophisticated costing systems should benefit greatly from these systems and ultimately improve their financial performance (Cagwin and Bouwman, 2002; Kaplan and Cooper, 1998; Maiga and Jacobs, 2007, 2008).

[104] The relationship between service cycle time reduction and cost reduction was discussed in chapter 6, sub-section 6.3.2.5.

In addition, the field interviews elicited views that support the applicability of CSS to assist in cost reduction. All of the interviewees confirmed the hypothesis results because they thought that CSS provides details about the costs which help them to eliminate non-value-added activities, thereby reducing costs and improving financial performance. The interviewees commented:

> I think you understand more about the way things are costed, and therefore you are more likely to achieve cost reductions, which would improve your financial performance as well. (Company A)

> The level of detail is going to directly allow you to go back to your [cost] pool and get cost reductions, definitely, which is going to improve your financial performance, so you would be able to be get everything at a detailed level and use that information to reduce your costs. (Company C)

> The more you can act upon your findings and reduce costs down, so yeah, you need to be able to measure [costs] to make changes. … So, the more information you have then the more you are able to drive costs down within your business. (Company C)

Table 8.3 also shows that cost reduction has a positive association with improved business financial performance ($\beta = 0.37$, $p \leq 0.001$).[105] Regarding the indirect effect, H_{9b} specifies that cost reduction will positively mediate the relationship between CSS and financial performance. Companies using sophisticated costing are more likely to benefit from it in terms of cost reduction. The results of the mediation analysis are reported in Table 8.4 below. As shown in the table, cost reduction mediates the relationship between CSS and financial performance ($\beta = 0.30$, $p \leq 0.01$), and the indirect effect did not include zero between the lower and upper levels of the 95% confidence interval. Hence, this ultimately and indirectly improves their financial performance. Consequently, the role of cost reduction between CSS and financial performance is a partial mediation, as there is a direct association between CSS and financial performance ($\beta = 0.21$, $p \leq 0.05$). The findings regarding the mediating role of cost reduction are in accord with Cooper and Kaplan's (1991a) theoretical argument that a costing system can

[105] The relationship between cost reduction and financial performance was discussed in chapter 6, sub-section 6.3.2.6.

improve managerial knowledge and enhance decision-making, which leads to improvements in financial performance.

Table 8.4: Mediation relationships in the CSS model

Paths	Indirect, direct, total effect	β[a]	LLCI[b]	ULCI[c]	*p* value
Service diversity → Cost structure → CSS	Indirect effect	0.02	-0.02	0.09	0.25
	Direct effect	0.04	-0.21	0.23	0.66
	Total effect	0.06	-0.19	0.25	0.56
Differentiation strategy → Service diversity → CSS	Indirect effect	0.03	-0.18	0.17	0.65
	Direct effect	0.23	-0.04	0.67	0.09
	Total effect	0.26	0.04	0.57	0.02
Differentiation strategy → Cost structure → CSS	Indirect effect	0.07	0.02	0.18	0.01
	Direct effect	0.23	-0.04	0.67	0.09
	Total effect	0.29	0.04	0.72	0.02
CSS → Service quality → Financial performance	Indirect effect	0.21	0.06	0.43	0.01
	Direct effect	0.29	-0.19	0.81	0.18
	Total effect	0.50	0.13	0.98	0.02
CSS → Service cycle time reduction → Financial performance	Indirect effect	0.10	-0.15	0.38	0.32
	Direct effect	0.29	-0.19	0.81	0.18
	Total effect	0.39	-0.15	0.87	0.11
CSS → Cost reduction → Financial performance	Indirect effect	0.30	0.08	0.87	0.01
	Direct effect	0.29	-0.19	0.81	0.18
	Total effect	0.59	0.28	1.13	0.00

[a] Standardised coefficient (β).
[b] Lower limit of bootstrapped 95% confidence interval.
[c] Upper limit of bootstrapped 95% confidence interval.

8.4 Qualitative findings regarding the factors which can influence CSS

An additional question of the fieldwork was to explore the interviewees' opinions concerning any alternative variables not covered by the current study. The following sub-sections will present the field study results regarding the possible factors that can influence CSS, namely: (1) complexity of service, (2) financial resources, (3) top management support, and (4) organisational complexity.

8.4.1 Complexity of services

The first potential factor, which was identified by the interviewees, refers to the complexity of the services, which was discussed in sub-section 8.3.1.8. According to Benedettini and Neely (2012a, 2012b), there are several potential factors that enable a distinction to be drawn between a complex and a simple service across multiple dimensions. The high complexity of a service may result in an increase in the overhead costs, which lead companies to use sophisticated costing systems in order to avoid cost distortion.

8.4.2 Financial resources

The second potential factor constitutes a financial resource, which is one of the internal environmental factors (Noh et al., 2011; Rotefoss and Kolvereid, 2005) that can influence the level of a sophisticated costing system, such as ABC (Rankin, 2020). This factor was justified and had been experienced by all interviewees. The interviewees reflected thus:

> I would say the ability of the business to afford a proper cost system. Ability to finance the costing model. If it is a very sophisticated costing model, it could take a lot of cost to operate, so the ability to have the financial resources to implement it. (Company A)
>
> You have got to have the money to spend on a sophisticated cost system. If you have not got the money, you cannot have one. (Company B)
>
> Obviously, you have got to have the cost of having a sophisticated system. This is the main driver for most businesses. (Company C)

All three interviewees concurred with the proposition that the availability of financial resources in companies can assist investment in sophisticated costing systems rather than other business resources and the business unit's size. Financial resources demonstrate demonstrably different traits to other business resources (Shapiro, 1999).[106]

The concept of financial resources includes the totality of fiscal assets which an organisation can employ. Specifically, they are aspects of an enterprise's liquid assets and are typically utilised as company continuity funds in order to facilitate the uninterrupted operation of the enterprise (Pride et al., 2010). Financial resources can be quantified using the variables of cash flow, debt capacity, and equity availability (Shapiro, 1999). Hence, the interviewees argued that, if a company has funding and financial resources, they tend to employ a sophisticated costing system. As the use of sophisticated costing systems, such as ABC, is expensive (Kaplan and Cooper, 1998), companies will need sufficient financial resources in order to invest in them. Subsequent research might seek to verify this opinion through a qualitative investigation pertaining to service providers. It is anticipated that a qualitative methodology would enhance the quality of the theoretical reasoning in respect of the potential relationship between financial resources and CSS. This may lead to a quantitative measure of the availability of financial resources.

8.4.3 Top management support

A third possible factor influencing CSS occurs in circumstances when the top management provides support for the development and use of sophisticated costing systems, such as ABC. The top management support is one of the organisational factors that may affect costing

[106] There are seven principal forms of business resource; namely: (1) financial resources, such as cash flow; (2) physical resources, such as plants; (3) human resources, such as the number of employees; (4) legal resources, in the shape of phenomena such as copyright; (5) information technology recourses, such as a supply chain modelling system; (6) marketing resources, such as goodwill; and (7) organisational resources, such as a training system (Shapiro, 1999).

systems (Al-Sayed and Dugdale, 2016; Baird et al., 2007; Pike et al, 2011). This factor was justified and experienced by one interviewee (Company A). According to Brown et al. (2004), top management support denotes the vigorous, overt fostering of invention and modernisation by higher managers, including CEOs (Chief Executive Officers) or CFOs (Chief Financial Officers). Furthermore, the concept of top management support signifies the importance of innovation within an organisation. When lower level managers opt to apply ABC, there are higher levels of associated risk (Brown et al., 2004). Conversely, when the top management supports the use of ABC, the project-related risks are diminished. Similarly, when senior managers demonstrate overt backing for an endeavour, the ambiguity falls, adoption becomes easier, and access to resources and issue resolution mechanisms in cross-boundary contexts rise (Brown et al., 2004). The interviewee in company A commented thus:

> The culture is one that … you will not make a costing system work if you have not got the buy-in of the management and the team to make it work. If it is very sophisticated, then you have to have the buy-in of the culture of the business to make it work. Because if you do not have the culture and the people who want to make it work, it will not work because, if it is very sophisticated and part of it goes wrong, but if 90% of it works okay, but you have got 10% with somebody who … or parts of the organization who do not [… make it work], either want it to work or cannot make it work, then the 90% is almost worthless because you have not got the true figures. (Company A)

Top management support is heavily reliant upon the familiarity of the higher-level managers with the advantages of any modifications imported to the business unit. According to Shields (1995), top management support remains unattainable in the absence of management appreciation of the value of innovative administrative change, such as the adoption of ABC. When this does arise, it becomes possible to guide the resources, objective, and planning in the direction of embracing and executing innovation (Tamara et al., 2020).

The previous literature concerning costing systems has identified a significant relationship between top management support and the level of sophisticated costing systems (i.e. ABC and AM usage) (Al-Sayed and Dugdale, 2016; Baird et al., 2007; Brown et al., 2004; Krumwiede, 1998). The significant relationship between top management support and ABC found in the prior quantitative research is in line with recent qualitative research (a case study) in a Chinese manufacturing company by Tamara et al. (2020), who found that the support of the top management can encourage companies to adopt ABC. Four principle measurements were used in the previous research to determine the top management support; namely: (1) commitment, (2) the provision of adequate resources, (3) communication, and (4) authority (Baird et al., 2007).

8.4.4 Organisational complexity

Organisational complexity comprises another potential organisational factor (Dooley, 2002). This factor was justified and experienced by one interviewee (Company C). As Biemans et al. (2001) note, "Complexity concerns the structure of business processes: the variety and manyness of elements and relationships between them" (Biemans et al., 2001, p.119). Organisational complexity signifies the degree of diversity within the constituent parts of any given enterprise, as stated by (Dooley, 2002). In operational terms, this can be manifested as a multiplicity of professional specialisms or fields within the enterprise. Hence, a hospital incorporates a large, diversified number of professional specialisms in order to maintain its natural functionality and must, therefore, be regarded as a more complex organisation than a school. Moreover, according to Dooley (2002), organisational complexity is also exhibited through diversity in an enterprise's authority framework, sites of control, overall structure, product range, technological approaches and workforce characteristics. The management accountant in Company C explained how the complexity of business can influence CSS as follows:

> I think it depends on the type of business, so the diversity of the business and therefore the cost of actually having a costing system. Higher diversity, for instance, our business, we are a project management business, we are a supply business, we are an R&D business, so there is lots of different elements there. The cost to our business of having a costing system that goes across all of those different areas is quite expensive, whereas a very simple business that only has one output, a manufacturing business, purely manufacturing, you are going to be able to get a far simpler costing system to allow you to have all the output but a far reduced cost. (Company C)

The complexity of business units means that these units possess a number of divisions (elements or department), and that each division has its own output. To the author's best knowledge, no existing studies have investigated the relationship between organisational complexity and CSS. Hence, it would be difficult to justify changing the model based on the view of one interviewee.

8.5 Qualitative findings regarding possible performance factors which CSS may influence

The field research was conducted to explore the interviewees' opinions concerning the performance factors which could potentially be shaped by CSS. The following sub-sections will present the field study results regarding possible performance factors which CSS may influence, namely: (1) employees' satisfaction with the costing systems, and (2) the quality of the decision-making.

8.5.1 Employees' satisfaction with the costing systems

The satisfaction with the costing systems was mentioned by one interviewee. Sophisticated costing systems rely on both multiple cost pools and cost drivers to govern the allocation of the overhead costs (Al-Omiri and Drury, 2007; Drury and Tayles, 2005). Consequently, acquiring precise product cost information, as facilitated by a sophisticated costing system, such as ABC (Mishra and Vaysman, 2001; Cooper and Kaplan, 1988a), may result in enhanced overall company effectiveness, strengthened activity, improved strategic choices and, subsequently, greater employee satisfaction (Tamara et al., 2020). In addition, it can further diminish product and/or service cost distortions. Sophisticated costing systems such as ABC create a more accurate allocation of the overhead costs, products and services, resulting in the enhanced satisfaction of the users of sophisticated costing systems (Tamara et al., 2020), including management accountants and financial directors (Al-Omiri and Drury, 2007; Schoute, 2009).

Previous studies in the field of costing systems explored the manner in which the participants assessed the value or usefulness of such systems. Research included areas such as participant opinions regarding the effectiveness of costing systems, user perceptions of costing systems, and management appraisals of the different technical attributes of costing systems, including their relevance and trustworthiness (Abernethy at al., 2001; Clarke and Mullins, 2001; Cohen et al., 2005; McGowan and Klammer, 1997; Pike et al., 2011; Schoute, 2009).

As the interviewee mentioned in the quotation below, the ability of CSS to influence employee satisfaction can result in improved financial performance. According to Ryan et al. (2002), behavioural theories clarify the manner in which the scheme and application of an accounting system are shaped by the workforce. Behavioural concepts can also be used to explore areas, such as financial performance, and the impact of accounting systems on the satisfaction and performance levels exhibited by the workforce. When used in combination with the models embodied in contingency theory, behavioural approaches can help to elucidate the extent to which employee satisfaction mediates the relationship between CSS and financial performance according to Drazin and Van de Van (1985). The financial director commented:

> You would hope that, with cost sophistication, I am thinking that you have invested a lot of time and effort in implementing it and also running it so you only do that if you are actually getting a payback and therefore from that payback is where your satisfaction is coming. The [employees'] satisfaction of the costing systems can affect financial performance. If you can see a connection, you can join the dots and say, because we did that, I can see that that is being influenced, then satisfaction follows. (Company A)

8.5.2 Quality of decision-making

The second possible factor consists of the quality of the information that can be utilized in decision-making. In other words, the more sophisticated the costing system, the more likely it is that quality information will be produced for use in the decision-making process. Similarly, costing systems which possess lower levels of sophistication would be expected to generate lower quality information. Dependence upon a low sophisticated costing system, in circumstances where the overhead costs are comparatively high, can culminate in crosssubsidization between products and services. As a direct consequence, the quality of the decision-making will invariably be impaired (Al-Sayed and Dugdale, 2016; Bjørnenak, 1997; Cooper and Kaplan, 1988a). Sophisticated costing systems only work in relation to given activities. Hence, the management may take quality decisions when it knows the nature of each activity (Schoute, 2009). Company A's financial director and C's management accountant explained how CSS has a direct impact on the quality of the decision-making:

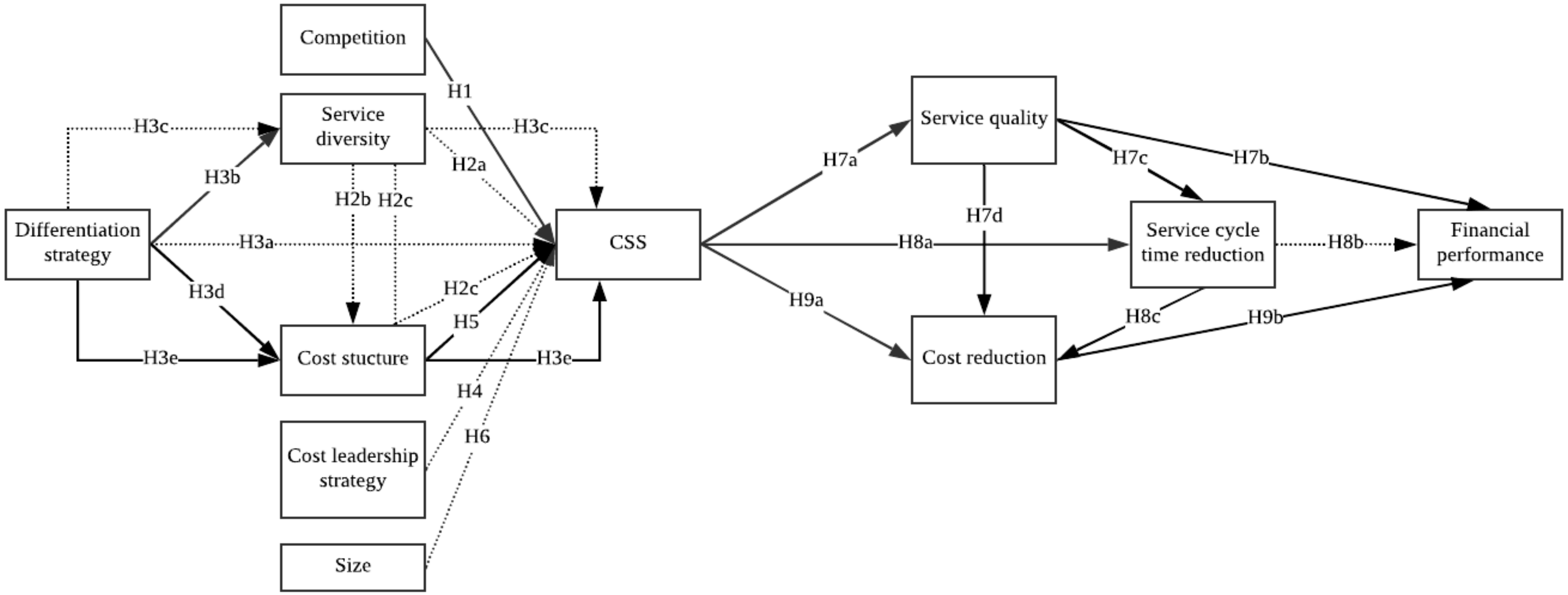
> Just better management information to use as a reference point for your decisions. What is the reason for a management team to make decisions? To steer the ship in the right direction so it's telling you if there's an iceberg in the water, your information system, it's telling you to avoid it. Otherwise, without that, you are going to hit it and the ship sinks. (Company A)

> I think you need to see the output of it. So if you are getting detailed information out that is allowing you to make the correct decisions to, in our case, reduce cost would be the end goal, then, yes, you are more likely to put more input into using that system and be more sophisticated about it. (Company C)

To the best of the author's knowledge, most existing literature in this field examines the success of ABC adoption in terms of the decisions related to product planning and cost management and not for the quality of decision making (Cohen et al., 2005; Ditkaew and Pitchayatheeranart, 2019; Innes and Mitchell, 1995; John Innes et al., 2000; Maiga and Jacobs, 2007; Shields, 1995).

8.6 Conclusion

This chapter presents the descriptive statistics for CSS. In addition, it discusses the quantitative and qualitative results obtained from the questionnaire and interviews, respectively. The quantitative analysis of the CSS model is presented in Figure 8.3. The main results for the CSS model showed that competition and cost structure had a direct and positive relationships with CSS. In addition, cost structure fully mediated the relationship between differentiation strategy and CSS. Furthermore, service quality and cost reduction partially mediated the relationship between CSS and financial performance. The qualitative analysis endorses the quantitative results but also introduces contingent and performance factors that should be considered in future research.



The solid line indicates a relationship.
The dotted line indicates no relationship.

Figure 8.3: The hypotheses results for the CSS model

Chapter 9: Conclusion

9.1 Introduction

This thesis aims to contribute to costing systems literature by adding to the general understanding of the adoption of activity-based costing (ABC), use of activity management (AM), and the level of cost system sophistication (CSS). This will strengthen knowledge of the most important contextual elements affecting ABC adoption, AM usage, and the design of sophisticated costing systems amongst UK non-manufacturing companies. Simultaneously, it should also more readily enable the identification of any unexpected benefits that may be realised through ABC adoption, AM usage, and CSS. This chapter is organised as follows: section 9.2 provides an outline of the current research, while section 9.3 furnishes a summary of the research findings. Section 9.4 presents the expected contribution of this research, and section 9.5 presents the research implications, while section 9.6 reports the research limitations. Section 9.7 includes suggestions for future research, and, finally, section 9.8 offers a conclusion to this chapter.

9.2 Research outline

As demonstrated in section 1.3 of chapter 1, this research sought to address two objectives:

1. To examine the extent to which a set of contingent factors influence ABC adoption, AM usage, and the level of CSS; and
2. To examine the indirect influence of ABC adoption, AM usage, and CSS on financial performance through non-financial performance factors.

The extant literature on costing systems has several limitations regarding the underlying concepts and contingent variables of costing systems, particularly with regard to the effect of costing systems on performance. The following discussion considers these limitations and explores how this research contributes to the literature by identifying and addressing these limitations.

Previous studies have focused on ABC adoption, yet scant attention has been devoted to AM usage, despite the fact that AM usage is indicative of the extent to which ABC has been used (Baird, 2007; Baird et al., 2004; Gosselin, 1997). This can be defined in terms of three different levels of intensity: activity analysis (AA) usage, activity-cost analysis (ACA) usage and ABC usage. AM usage is thus significant in terms of investigating (1) which contingent variables affect intensity level, (2) how levels of AM affect non-financial and financial performance and (3) how to reconcile the results of earlier research with the existing study's results, particularly where these conflict in respect of the variables influencing ABC adoption. It is possible that those companies which have not permanently adopted ABC may be prepared to embrace it temporarily on an ad hoc basis. Alternatively, certain companies which have not adopted ABC might still display limited AM usage under certain circumstances, including the undertaking of special studies. Accordingly, this research tested ABC adoption and AM usage models separately in order to acquire an in-depth appreciation of their differences.

This research also contributes to the literature on cost system design through its measurement of CSS, as based on the number of cost pools, volume cost drivers, and non-volume cost drivers. This approach contributes to the existing literature by supporting the idea that CSS adopts a far broader approach for analysing cost systems, allowing such costing systems to range from the simple to the highly sophisticated. Additionally, this approach makes a contribution to the literature by exploring which variables affect CSS, alongside examining how CSS influences non-financial and financial performance.

The prior literature has generally provided an incomplete picture of costing systems' role through adopting the selection form of fit approach (Drazin and Van de Van, 1985). While the selection form of fit has been pervasively adopted for management accounting research, it only focuses on the effect of contingent factors on costing systems, and thus offers insufficient attention to the ways in which organisational performance is affected by costing systems. Consequently, this study contributes to the literature by applying the mediation form of fit approach in contingency theory. This approach offers a more comprehensive picture regarding the ways in which the contingent variables affect costing systems, in addition to examining how costing systems affect non-financial and financial performance.

Six contingent variables were deemed to require investigation in relation to costing systems in this study, and their different relationships to costing systems were investigated; these were competition, service diversity, differentiation strategy, cost leadership strategy, cost structure and organisational size. In addition to investigating their direct effects, several different mediation relationships were tested, including (1) cost structure's effects on the service diversity-costing systems association, (2) service diversity's effects on the differentiation strategy-costing systems association and (3) cost structure's effects on the differentiation strategy-costing systems association. Additionally, with regard to the influence of costing systems on performance, the existing research expanded on the costing system-performance literature by offering an analysis of the potential mechanisms of costing systems that may affect financial performance via non-financial performance variables. The non-financial performance variables were thus conceptualised respectively in relation to enhanced service quality, service cycle time reduction and cost reduction.

To analyse the proposed research models, a quantitative design with supplementary interviews was implemented. A questionnaire process was devised, implemented, and analysed, with supplementary semi-structured interviews with a management accountant and two financial directors added. The questionnaire was mailed to 2,000 UK non-manufacturing companies, and 219 usable questionnaires were collected (effective response rate = 10.95%). Structural equation modelling (SEM) in Analysis of a moment structures (AMOS) was then applied to test the research hypotheses and theoretical model. Following this, the supplementary interviews with three practitioners included queries about the statistical findings. A data matrix for thematic analysis was then used to analyse the resulting qualitative data (Nadin and Cassell, 2004). The interviews were thus used as supplementary evidence and as a means of obtaining interviewee opinions about the quantitative results. The interviews also ascertained the participants' views regarding certain unexpected results arising from the quantitative work, seeking to determine participant views on potential contingent factors and influential performance factors affecting ABC adoption, AM usage, and CSS models. Due to the insufficient number of interviews, any additional factors arising from these supplementary interviews were not used to modify the current research model. However, they do offer suggestions for future research, which will be discussed in section 9.7. Based on this outline of the research, the next section offers a summary of the research findings.

9.3 Research findings summary

The following sub-sections present a summary of the research results and address the two groups of research questions.

9.3.1 The influence of contingent factors on ABC adoption, AM usage, and CSS

Contingent factors-ABC adoption associations

The research found that differentiation strategy and cost structure have a direct and positive effect on ABC adoption. However, competition, service diversity, cost leadership strategy, and size are not significantly related to ABC adoption. In terms of mediation relationships, the study found that cost structure partially mediates the relationship between differentiation strategy and ABC adoption. The interviewees disagreed with the quantitative result that cost leadership strategy does not have a significant relationship with ABC adoption. They provided an alternative interpretation which reflected a connection between cost leadership strategy and ABC adoption. Furthermore, most interviewees agreed that no relationship exists between service diversity and size and ABC adoption, providing interpretations which reflect a lack of connection between these contingent factors and ABC adoption. The interviewees agreed that an indirect relationship between competition and ABC adoption may be possible when this is mediated by a differentiation strategy. In addition, the field study found that the complexity of services, financial resources, top management support, and the enterprise resource planning (ERP) system were all factors identified as facilitating the adoption of ABC.

Contingent factors-AM usage associations

All hypotheses relating to the effect of contingent factors on AA usage and ACA usage were rejected. As discussed in chapter 7, the possibility of these two variables not being linked to costs offers a potential reason for this, which was supported by the supplementary interviews. In addition, the research found that competition has a direct and positive effect on ABC usage, while service diversity, differentiation strategy, cost leadership strategy, cost structure and size are not significantly related to ABC usage. The interviewees disagreed with the quantitative result that cost structure does not have a significant relationship with ABC usage, providing interpretations which reflected a connection between cost structure and ABC usage. Furthermore, most interviewees agreed that no relationship exists between service diversity, differentiation strategy, cost leadership strategy, and size, and ABC usage, offering interpretations which reflected the lack of connection between these contingent factors and ABC usage. The field study found that top management support and financial resources were identified as factors facilitating ABC usage.

Contingent factors-CSS associations

The study found that competition and cost structure have a direct effect on CSS, although service diversity, differentiation strategy, cost leadership strategy and size were not significantly related to CSS. In terms of mediation relationships, the study found that cost structure fully mediates the relationship between differentiation strategy and CSS. Some interviewees disagree with the quantitative results that suggested that differentiation strategy and cost leadership strategy have no significant relationship with CSS, and these interviewees offered different interpretations of the connection between these contingent factors and CSS. In addition, the field study found that the complexity of services, financial resources, top management support, and organisational complexity were regarded as facilitating the adoption of sophisticated cost systems.

9.3.2 The influence of ABC adoption, AM usage and CSS on non-financial and financial performance

ABC adoption-performance association

The research found that ABC adoption has a direct relationship with service cycle time reduction and cost reduction, while ABC adoption is not significantly related to service quality and financial performance. In terms of mediation relationships, the study found that cost reduction is fully mediated by the relationship between ABC adoption and financial performance. Most interviewees agreed that no relationship exists between ABC adoption and service quality, subsequently providing interpretations which reflected the lack of connection between these two variables. In addition, the field study found that employees' satisfaction with cost systems and the quality of decision-making were regarded as outcome factors in the adoption of ABC systems.

AM usage-performance association

All hypotheses relating to the effect of AA usage and ACA usage on non-financial and financial performance were rejected. However, ABC usage has a direct relationship with service cycle time reduction, and cost reduction, and is not significantly related to service quality. In terms of mediation relationships, the study found that cost reduction is fully mediated by the relationship between ABC usage and financial performance. Most of the interviewees agreed that no relationship exists between ABC usage and service quality, offering interpretations which reflected the lack of connection between these two variables.

CSS-performance association

The study found that CSS had a direct relationship with financial performance, service quality, service cycle time reduction, and cost reduction. In relation to mediation relationships, the study found that service quality and cost reduction partially mediated the relationship between CSS and financial performance. The field research concluded that employees' satisfaction with costing systems and the quality of decision-making were regarded as outcome factors with regard to the adoption of sophisticated costing systems.

9.4 Research contributions

Fuller comprehension of ABC adoption, AM usage, and CSS practice allows costing systems associated with academic research to be incrementally improved. This was one of the principals aims of this thesis. ABC adoption, AM usage, and the CSS by UK non-manufacturing firms depends on significant contextual factors, which should be more effectively understood based on the results of this study that has focused on ascertaining the costing systems' anticipated advantages and strengths. The contributions of this thesis can be understood at the theoretical, methodological and empirical levels.

9.4.1 Theoretical contributions

This thesis offers two main theoretical contributions.

The first theoretical contribution: the mediation perspective of the contingency theory

The application of the selection form of fit is used in ABC research (e.g. Bjørnenak, 1997; Brierley, 2011; Brown et al., 2004; Jusoh and Miryazdi, 2015; Khalid, 2005; Krumwiede, 1998; Malmi, 1999; Schoute, 2004), AM usage research (e.g. Askarany et al., 2010; Baird, 2007; Baird et al., 2004; Gosselin, 1997), and CSS research (e.g. Abernethy et al., 2001; Al-Omiri and Drury, 2007; Brierley, 2008b; Drury and Tayles, 2005). These researches did not go far enough to consider the impact of ABC adoption, AM usage cost system sophistication on performance. It assumes that all organisations are in equilibrium, with no expected difference in performance. However, previous researches used the selection form of fit are important to the current knowledge to build and develop a comprehensive model which include the influence of contingent factors on costing systems and the influence of costing system on performance.

In accordance with earlier studies (Drury and Tayles, 2005; Kaplan and Cooper, 1998), the current research proposed an integrated cost system model capable of representing the function performed by such a system in companies in the form of distinct relationships. It has been maintained that environmental and organisational variables affect (1) ABC adoption, (2) AM usage, and (3) CSS, enabling companies to enhance their non-financial performance variables to indirectly enhance financial performance. The current research adopted the mediation form of fit approach. This study thus aimed to test the direct and indirect relationships between different variables as a means of investigating different relationships related to (1) ABC adoption, (2) AM usage and (3) CSS. Unlike previous cost system models, the mediation form of fit does not depend on the selection form of fit associated with contingency theory. It allows academics to investigate more complex aspects of the business environment pertaining to ABC adoption, AM usage and CSS, in addition to examining how these dimensions are affected by several contingent factors. Furthermore, the mediation form of fit differs from the selection form of fit in contingency theory in that it affords insights into the implications these above-mentioned dimensions have for both financial and non-financial performance.

The mediation form of fit applied in this thesis thus contributes to knowledge in this area, and the statistical findings offer evidence that the mediation form of fit is superior with regard to its ability to supply explanations regarding variations in (1) ABC adoption, (2) AM usage and (3) CSS. The common features of contingent factors may be explained via the combined use of the mediation form of fit of contingency theory and SEM analysis, both of which illuminate the cost system's operational context. This means that major implications that may be overlooked by the selection form of fit of contingency theory are distinguished (Drazin and Van de Van, 1985). Through applying the mediation form of fit, this research was thus able to investigate six significant contingent factors with potential relationships with (1) ABC adoption, (2) AM usage and (3) CSS, namely competition, service diversity, differentiation strategy, cost leadership strategy, cost structure, and size. The results indicated that competition may result in ABC usage and CSS, as well as that differentiation strategy potentially lead to ABC adoption, and cost structure may lead to both ABC adoption and CSS. In terms of mediation relationships, the statistical results supported the mediation effect of cost structures between differentiation strategy and (1) ABC adoption and (2) CSS. Through investigating these relationships, this thesis provides an enhanced understanding of the lack of relationship between differentiation strategy and (1) ABC adoption and (2) CSS as has been suggested in the existing literature. In future research, academics should consider these contingent factors based on the mediation form of fit of contingency theory when attempting to analyse various costing system models.

Furthermore, the use of the mediation form of fit establishes a different conceptual lens through which to evaluate the relationships between the cost systems and financial performance, positing that (1) ABC adoption, (2) AM usage and (3) CSS, in and of themselves, do not enhance financial performance unless certain non-financial performance factors are also considered, namely cost reduction and service quality. The extant literature is thus insufficient for examining cost systems and financial performance. This is based on the fact that previous studies have reported conflicting results regarding the effect of cost systems on financial performance using the direct approach. The direct relationship between costing systems and financial performance has been criticised, given that the adoption of ABC or use of a substantial level of CSS may take time to affect financial performance (Krumwiede and Charles, 2014). However, costing systems such as ABC, may affect non-financial performance more rapidly, which is likely to be followed by changes in financial performance. This thesis thus clarifies the mechanisms whereby (1) ABC adoption, (2) ABC usage, and (3) CSS affect financial performance, based on influences on cost reduction, which in turn affects financial performance. Additionally, this research clarifies the mechanisms whereby CSS impacts upon financial performance via its contribution to service quality, which subsequently affects financial performance. The outcomes derived from using the mediation form of fit suggest that this framework should be employed to re-evaluate the conceptual models that have been previously used to analyse the effects of cost systems; such re-evaluation is necessary to identify all of the various ways in which cost systems and financial performance are linked.

The second theoretical contribution: AM usage

This thesis extends existing knowledge by examining the AM usage model alongside the ABC adoption model in order to both identify the contingent factors that influence them and to test the impact of AM usage on financial and non-financial performance. AM usage has been defined in terms of three different levels of intensity. The statistical results from this work show that the first and second levels of AM usage (AA and ACA, respectively) are not affected by the six contingent factors, and also have no effect on non-financial and financial performance. The potential theoretical reason for this may be that these two levels are not concerned with costs. The supplementary evidence from the interview data on AA usage and ACA usage model supports these quantitative results.

The research found that it is possible to use ABC when it has not been adopted. Combining the ABC adoption model and ABC usage model in a single study enabled more in-depth comparisons to be made regarding which contingent factors affect each model. For example, the statistical results showed that the differentiation strategy and cost structure only affect ABC adoption, while competition only affects ABC usage. ABC adoption includes all those companies that currently have adopted ABC, while ABC usage considers the extent of use. The different measurements between ABC adoption and ABC usage may explain why certain contingent factors affect one and not the other. For example, a significant relationship exists between competition and ABC usage, but not ABC adoption. According to the supplementary interviews, competition is an external variable that potentially does not affect a company's decision to implement ABC., yet companies that use ABC to a restricted degree and who do not adopt it in full, as well as companies that use ABC occasionally, may determine such use partially according to competition. Essentially, awareness of marketplace competition may inform the decision by some companies to use ABC, as well as persuading some companies to resolve not to adopt it.

Additionally, a significant relationship exists between ABC adoption, differentiation strategy, and cost structure that is not present for ABC usage. Differentiation strategy and cost structure may not comprise aspects of the decision to use ABC, although they may comprise part of the decision structure regarding ABC adoption. Based on the interview evidence, differentiation strategy and cost structure only affect ABC adoption due to these two variables potentially necessitating companies currently adopting ABC, which does not affect those with varying degrees of usage of ABC. This ensures that costs are captured in relation to the differentiation strategy used or substantial indirect costs within the cost structure. Ultimately, differentiation strategy and cost structure may be insignificant for those using ABC where this refers to companies that have not fully adopted it. There is a possibility that these companies do not differentiate their services nor have high indirect costs that would support their use of ABC.

9.4.2 Methodological contributions

This thesis may be considered as making a noteworthy contribution with regards to the adopted methodology (Cadez and Guilding, 2008). The design of the current study makes four methodological contributions.

The first methodological contribution: the measurement of ABC adoption

This thesis presents a methodological contribution with regard to ABC adoption. Various experiences of ABC adoption and non-adoption were considered in this research, including eight different experiences of ABC adoption. In contrast, previous studies have defined costing systems simply by ABC adoption and non-adoption, an approach that has attracted criticism. Worse, several studies concerning ABC adoption have measured ABC adoption according to only a single item (Kallunki and Silvola, 2008; Shields, 1995), while other studies have provided inadequate explanations of their definition of ABC adoption and non-adoption (Elhamma and Fei, 2013; Malmi, 1999). This thesis improved the measure of ABC adoption by adopting the most plausible items relating to both ABC adoption and non-adoption. The model of ABC adoption employed in this thesis thus has two dimensions: (1) ABC adoption by companies who currently fully use ABC and (2) the non-adoption of ABC by companies, reflecting eight distinct experiences of ABC. Using a binary variable wherein these different experiences are collapsed into a single category termed non-ABC adoption, which may enhance comprehension of company experiences with ABC. A number of earlier studies used a single item to measure ABC (adoption or non-adoption), which may not be truly reflective of the ABC experiences of these companies. For example, some companies who are still considering whether to adopt ABC were allocated to the ABC adoption category, despite the fact that they did not share specific characteristics with companies that had already adopted ABC (Alcouffe et al., 2019). In addition, using a binary variable may further explain why previous studies have failed to identify relationships between certain contingent factors and ABC adoption. A reason for this failure is that these studies included companies with any ABC experience under the classification of ABC adoption, including (1) companies who adopted ABC and then abandoned it (Van Nguyen and Brooks, 1997), and (2) companies who were considering adopting ABC (Innes and Mitchell, 1995; Jusoh and Miryazdi, 2015; Krumwiede, 1998; Schoute, 2004; Schoute, 2011). However, either type of company ought not to be categorised under ABC adoption as they differ significantly from companies which currently utilise ABC fully.

The more specific classification of ABC adoption and non-ABC adoption produced statistical results that supported the idea that differentiation strategy have a positive and direct relationship with ABC adoption. Comparing the current findings with those in the literature, Elhamma and Fei (2013) and Malmi (1999) failed to establish such a relationship between differentiation strategy and ABC adoption, which is potentially explained by their use of an inadequate measure of ABC adoption and non-ABC adoption (Alcouffe et al., 2019; Brierley, 2011). Additionally, the current results support a direct and positive relationship between cost structure and ABC adoption, while Van Nguyen and Brooks (1997) failed to identify such relationship. However, Van Nguyen and Brooks (1997) explored different experiences of ABC in relation to ABC adoption, including planning for future ABC adoption and ABC adoption followed by abandonment and planning to readopt it in the future. As companies with such experiences of ABC potentially show divergent characteristics from companies who fully adopt ABC, it is important to consider reclassifying these ABC experiences as actually being characteristic of non-ABC adoption.

The second methodological contribution: the measurement of CSS

This thesis is one of a limited number utilising innovative measurements of CSS, which is intended as a means of overcoming extant studies' shortcomings. The development of CSS measurement included three indicators: (1) the number of cost pools, (2) the number of volume cost drivers and (3) the number of non-volume cost drivers. As implemented in previous research, the measurement of CSS has suffered from two limitations. Specifically, research by Al-Omiri and Drury (2007), Drury and Tayles (2005), and Ismail and Mahmoud (2012) excluded those companies using variable costing systems (VCSs), only examining companies which incorporated overheads into their product costs. On this basis, their samples were incomplete, which the current research attempted to overcome. In addition, in contrast with other studies (Al-Omiri and Drury, 2007; Drury and Tayles, 2005), CSS composite measurement was not applied in this research, principally due to the fact that CSS cannot adequately convey the extent of business complexity, nor differentiate volume from non-volume cost drivers. The composite measurement used in the previous literature was based on the number of cost pools and cost drivers, offering a potentially insufficient measure given that no distinction is made between volume and non-volume cost drivers. This is also inaccurate if CSS composite measurement is included in the analysis as a composite score, as this may represent companies using traditional costing systems (TCSs) as well as those using more sophisticated costing systems. For example, if a company has ten cost pools and three cost drivers, it is not possible to determine from this whether it relies on TCSs or a more sophisticated costing system such as ABC, as it is not possible to determine whether the three cost drivers are volume and/or non-volume cost drivers. The present thesis resolves some of these limitations by (1) using a sample that includes companies that include overheads in their service costs and those that do not include them, thus retaining the potential to investigate all costing system types with regard to pools and drivers, and (2) not using CSS composite measurement; and thus using the number of cost pools, and volume and non-volume cost drivers separately as three indicators of the CSS construct.

The extant literature's shortcomings concerning CSS measurement may be one reason why such research has previously failed to establish firm relationships between CSS and certain contingent factors. For example, Drury and Tayles (2005) and Ismail and Mahmoud (2012) failed to establish any direct relationship between competition and CSS; while Al-Omiri and Drury (2007), as well as Drury and Tayles (2005), did not identify a direct relationship between cost structure and CSS. In contrast, the current study identified a direct relationship between both competition and cost structure and the selected CSS indicators (cost pools, volume and non-volume cost drivers). A potential reason for the lack of any relationship between competition, cost structure and CSS being identified in the previous research may be because of the CSS measurement adopted.[107] As explored previously, these studies only considered companies that included overheads in their product costs, as well as using a composite measurement of CSS, which may not accurately reflect CSS. This thesis has, however, established that a direct and significant relationship exists between competition and cost

[107] The current study replicated the extant method of measuring CSS by adopting (1) only the number of cost pools as well as (2) composite scores. Recoding of the number of cost pools for companies using VCSs was reduced to zero, and it was established that no relationship exists between competition, cost structure and CSS when CSS is measured by cost pool number. Additionally, no relationship exists between competition and CSS when CSS is measured based on composite scores. On the other hand, the current research's results found that there is a significant and direct relationship between competition and CSS (see sub-section 8.3.1.1), and between cost structure and CSS (see sub-section 8.3.1.3) when CSS was measured by three indicators (cost pools, volume and non-volume cost drivers).

structure, and CSS. This may not have arisen entirely due to the CSS measure, however, as it may also be due to the methods adopted for measuring competition and cost structure, as well as the current research sample being restricted to non-manufacturing industry.

The third methodological contribution: the measurement of contingent factors

The current thesis adopted multi-scale measurements with multiple items to overcome the prior research's limitations regarding the measurement of competition and business strategy. For example, Drury and Tayles (2005) used a single item to measure competition (intensity), failed to identify a direct relationship with CSS.[108] This research succeeded in identifying this relationship, however, this may not be solely due to the multi-scale measurements with multi-items of competition being used. It may also be a result of the methods used for measuring CSS, as well as a consequence of the sample being restricted to non-manufacturing industry. Malmi (1999) adopted an objective measure for differentiation strategy but was nevertheless unable to establish a direct relationship with ABC adoption, whereas the current research has done so. Again, this may not be solely due to the multi-scale measurements with multi-item differentiation strategy measure. It may also be a consequence of the adopted methods for measuring ABC adoption, as well as again being a result of the sample being restricted to the non-manufacturing industry. Nevertheless, using multi-scale measurements as opposed to a single objective measure or a single scale appears to enhance research constructs' validity and reliability.

[108] The current study replicated Drury and Tayles's (2005) method of measuring competition using only the intensity of competition, and found that there is no relationship exists between this single item of competition and CSS. On the other hand, the current research's result found that there is a significant and direct relationship between competition and CSS (see sub-section 8.3.1.1), when competition was measured by three indicators.

The fourth methodological contribution: the use of SEM

This thesis contributes to the literature in the area of statistical analysis by using SEM, which has not yet been extensively adopted in costing systems studies; the majority of research in this field has adopted bivariate analysis methods or multivariate statistical analysis (e.g. Al-Omiri and Drury, 2007; Bjørnenak, 1997; Brierley, 2008b; Drury and Tayles, 2005; Gosselin, 1997; Ismail and Mahmoud, 2012; Krumwiede, 1998; Malmi, 1999). SEM differs from multivariate statistical analysis (Hair et al., 2019) in that SEM may incorporate latent variables into any analysis alongside the directly observable variables. SEM may thus resolve errors in the coefficient estimates of hypothesised relationships based on correcting for measurement errors as relative to the number of indicators within each latent construct. In contrast, multivariate statistical analysis is unable to address and correct these measurement errors, potentially resulting in bias in the results (Hair et al., 2019). Furthermore, SEM is an especially effective technique when the model utilises variables that act as dependent variables in certain relationships and independent variables in other relationships. Accordingly, the current thesis adopted SEM in AMOS as a means of analysing a more complex research model (Charaf and Rahmouni, 2014; Maiga and Jacobs, 2008).

9.4.3 Empirical contribution

Research industry and context

This work overcame the previous literature's limitations arising from the examination of mixed industries (manufacturing and non-manufacturing) by focusing only on non-manufacturing industry. Focusing on manufacturing and non-manufacturing industries within a single research inquiry appears to produce inaccurate results (Alcouffe et al., 2019), as these two broad industry groups are heterogeneous, and should rightly be investigated separately as opposed to being amalgamated. Combining these two broad industries within a single study may potentially produce conflicting results as manufacturing companies have higher levels of material costs and a lower proportion of indirect costs compared to non-manufacturing organisations. For example, Elhamma and Fei (2013) and Malmi (1999) did not identify a relationship between differentiation strategy and ABC adoption when examining both industry types, while Brown et al. (2004) and Cohen et al. (2005) were also unable to establish a relationship between cost structure and ABC adoption in that situation. Similarly, Al-Omiri and Drury (2007) and Drury and Tayles (2005) failed to identify a relationship between cost structure and CSS in samples consisting of both manufacturing and non-manufacturing industries. This research, however, more narrowly focused on non-manufacturing industry, identifying that a relationship exists between the differentiation strategy and ABC, as well as between cost structure and each of ABC adoption, and CSS.

As a developed country, the UK is generally expected to adopt ABC, as well as engaging in a certain level of AM usage and CSS (Askarany and Yazdifar, 2012; Rankin, 2020), because ABC adoption rates may be affected by the education system, economic stability, and other particular contextual variables in developed countries (Rankin, 2020). Consequently, this research contributes to the literature with its focus on UK non-manufacturing industry as a homogenous group that had not previously been subjected to specific study. Conducting this study in the UK was a way to improve knowledge about this industry.

9.5 Research implications

The current thesis' findings have significant implications for practice. The (1) ABC adoption, (2) AM usage and (3) CSS models underpinned by the mediation form of fit approach contribute to practice in several ways. Through clarifying the degree of correlation between the contingent factors and (1) ABC adoption, (2) AM usage and (3) CSS, the research enables these various costing system aspects to provide pertinent cost information to match a company's environment. More specifically, financial directors or management accountants working in non-manufacturing companies can benefit from the findings in a number of circumstances. Those companies with differentiation strategy and high levels of indirect costs within cost structure should consider adopting ABC in order to capture the costs of their numerous activities and processes more accurately, thus enabling enhancement of decision-making. Further, companies which experience high levels of market competition should implement ABC usage to avoid over-or under-costing services. Companies with either high competition or high indirect costs should also increase their number of cost pools and distinguish between volume and non-volume cost drivers to accurately assign overhead costs to services, thus strengthening service cost accuracy.

The results also present the degree of association between (1) ABC adoption, (2) AM usage, (3) CSS, and financial performance, based on the indirect effect of non-financial performance variables. This should assist financial directors or management accountants by highlighting the mechanisms which enable costing systems to shape the financial performance of companies. ABC adoption, ABC usage, and CSS can be expensive and require various resources to implement. However, the findings based on the mediation form of fit indicate that ABC adoption, ABC usage, and CSS may indirectly contribute to strengthening non-manufacturing companies' financial performance through cost reduction. Thus, non-manufacturing companies must focus particular attention on cost reduction achievements during the adoption of ABC, the use of ABC to any extent, or the application of CSS, as these may make numerous activities and operation costs more visible, as well as allowing the employment of appropriate volume and non-volume cost drivers to enable financial directors and management accountants to limit costs, subsequently enhancing financial performance overall.

Additionally, the results based on the mediation form of fit show that CSS may contribute indirectly to strengthening non-manufacturing companies' financial performance through improving service quality. Non-manufacturing companies must, however, pay particular attention to improving service quality while adopting CSS, as they may engage in numerous activities and must thus seek to comprehend which activities add value and which do not. This will enable financial directors and management accountants to eliminate some non-value-added activities, thus strengthening financial performance.

9.6 Research limitations

As with all research projects, several limitations to this study may be highlighted that could be addressed during further research.

First limitation: Causality between variables

The hypothesised relationships in the models may display recursive or reverse causality (Otley, 2016) due to the nature of the collected data, as cross-sectional survey data pertaining to a particular temporal moment does not allow clarity with regard to inter-variable causality (Saunders et al., 2016; Van der Stede, 2014), merely indicating some relationship between variables. To strengthen claims relating to causality, future research should be conducted in the form of longitudinal surveys, collecting data over time (Saunders et al., 2016) from the same participants in order to observe any reciprocal relationships relating to the effect of investigated contingent factors on (1) ABC adoption, (2) ABC usage and (3) CSS, as well as examining the effect of (1) ABC adoption, (2) AM usage and (3) CSS on non-financial performance variables and, ultimately, financial performance.

Second limitation: Discriminant validity

Competition, differentiation strategies, service diversity, and service cycle time reduction variables were identified as lacking discriminant validity in this research, which represents a further limitation of this study, as the researcher had to eliminate one indicator from each of these constructs as a means of resolving discriminant validity problems. However, the methodical approach implemented, which involved a review of the relevant measurement scales applied in earlier studies, compliance with the suggestions issued by Dillman et al. (2014) with respect to survey design, and pilot testing of the questionnaire before widespread dissemination, was robust, and other studies on costing systems have rarely adopted such thorough methods of analysis (e.g. confirmatory factor analysis [CFA] of SEM) to assess the reliability and validity of their research constructs. Consequently, this work should aid future studies in the selection of those constructs demonstrating the highest reliability and validity (e.g. Al-Omiri and Drury, 2007; Brierley, 2007; Drury and Tayles, 2005; Krumwiede, 1998). Future studies should choose a measurement scale for constructs and then confirm the validity and reliability of the scale via a CFA approach as, un like other approaches, this particular approach has been confirmed to offer precise statistical evaluation of overall construct validity.

Third limitation: Response rate

This thesis' research population focused only on medium and large UK non-manufacturing companies; however, the usable response rate (10.95%) was inadequate to generalise any the research results to the full population of medium and large UK non-manufacturing companies. Consequently, the thesis results' generalisability across medium and large UK non-manufacturing companies is potentially invalid. On this basis, the research results should be treated with caution and replicated among a wider sample of medium and large UK non-manufacturing companies.

Fourth limitation: Methodology

The current research used a quantitative design overall, with a selection of interviews used as supplementary evidence. The current research is not classified as mixed methods, however, because it relies upon the survey-based method as its main form of data collection to allow the research hypotheses to be tested. While the current research used supplementary interviews to support its findings, they are insufficient in number to make amendments to the models for future quantitative testing. Consequently, a more cohesive mixed method design, specifically a sequential explanatory strategy with a more adequate volume of interviews, would be beneficial to investigate possible amendments to future quantitative testing models.

According to Bryman and Bell (2015), mixed methods is a methodology for advancing research through the systematic integration of both quantitative and qualitative data in a single investigation. The procedure is premised on the argument that this combination allows more complete and synergistic utilisation of data as compared to individual qualitative and quantitative collection and analysis of data. The benefits of mixed research methods include the ability to compare qualitative and quantitative data, reflect on participants' points of view, and foster scholarly interaction. Furthermore, the method allows the provision of methodological flexibility alongside the collection and utilisation of rich, comprehensive data (Bryman and Bell, 2015).

In Brierley's (2014) research, a mixed methods approach was suggested to mitigate the three limitations identified with regard to solely quantitative research strategies. The first of these limitations is that a purely quantitative strategy usually excludes certain variables; this can be directly addressed by adding a qualitative element to the research strategy. The second element is that although quantitative findings are generalisable, they may not be applied across all research questions to the same degree. Finally, "quantitative research models that are developed from the results of prior quantitative research may not reflect the understandings of potential subjects to the research" (Brierley, 2014, p. 339). Brierley also identified a further set of issues that may be associated with a qualitative-only strategy; for example, qualitative methods do not work well for testing previous theories and hypotheses, and the potential for results being affected by the personal bias of the investigator or the small sample sizes used in qualitative research are also complicating issues (Brierley, 2014).

Both Brierley (2014) and Creswell (2014) posit the notion that when a qualitative method such as interviews is used to enhance the results of the quantitative study, this provides guidance regarding the significance (and non-significance) of the quantitative findings. The initial quantitative phase may produce results that are unexpected in terms of the relationships between dependent and independent variables, and thus qualitative findings can help to ascertain and verify the reasons behind these. Brierley (2014) and Creswell (2014) are also in agreement about the fact that, when these relationships are explored in more detail, researchers can use this information to refine or redefine the variables and the relationships between them.

In Brierley's view (2014), the significance of quantitative results can be enhanced and refined when the opinions of participants are sought, as this helps to refine the credibility of results by adding a dimension of greater understanding about the reasons behind the relationships. Ittner (2014) suggests that the causal relationships between the predictors and outcome variables of a study are validated and given credibility when the quantitative results are not only in agreement with the proposed hypotheses, but also coincide with the qualitative results for the research subject.

When qualitative data is used in the second phase of a mixed methods approach, however, new variables may emerge that may not have been covered by the existing quantitative study, but which are nonetheless considered relevant by practitioners. These new variables, having been identified as necessary by participants, may lead in the current case to the identification of further factors influencing ABC adoption, AM usage, and CSS that were not identified in the development of the quantitative model designed for this research. These factors may also not have been part of previous costings systems research, though they may also have the potential to deliver improvements to the research models used for statistical testing in the future.

An alternative approach to research design is to adopt an exploratory sequential design. The qualitative data analysis and collation stage within this strategy is completed first; the collation and analysis of quantitative data then follows (Creswell, 2014). Qualitative data are prioritised over quantitative data in this case, and methodologies assimilated throughout the study's interpretation phase. A specific theoretical perspective may or may not be used in this approach (Creswell, 2014). It may be difficult to undertake this research when the researcher does not have direct access to practitioners. Consequently, it may be more practicable to undertake the quantitative element first and then use the questionnaire respondents as a means of contacting potential interviewees. An explanatory and exploratory sequential design to mixed methods approach thus offers original and significant contextual information for future prospective research.

9.7 Suggestions for future research

In the preceding section, certain limitations of this thesis were identified, which offer potential areas for future research. This section further details the opportunities arising from the quantitative results and supplementary interview outcomes. This section also presents specific suggestions for the examination of the ABC adoption model, ABC usage model and CSS model.

Competition - ABC adoption association

Competition was hypothesised as being positively related to ABC adoption; however, the statistical results failed to establish a direct relationship between these. As discussed in sub-section 6.3.1.1, the method of measurement of competition is a potential reason for this, as it did not capture all dimensions of competition (Aljabr, 2020). According to Holm and Ax (2020), future research should seek to distinguish between competition intensity and competition type. Competition intensity may be measured via the Herfindahl-Hirschman Index (HHI) (Holm and Ax, 2020). “HHI measures concentration within an industry and is calculated as the sum of the squared market shares across firms within an industry” (Holm and Ax, 2020, p. 6), while competition type can be measured according to price, service, products, and quality. “There is a need for more research describing the joint effects of competition intensity and competition type on the design of various types and purposes of [management accounting systems] MASs in distinct competitive contexts” (Holm and Ax, 2020, p. 12). This is further supported by the need for more accurate measurement of ABC adoption and non-adoption. This thesis used ABC adoption construct four to distinguish ABC adoption and non-adoption, and by including only this construct, the results for the three models (ABC adoption, AM usage and CSS) were able to be based on the same sample size.[109] The current research also included several experiences of ABC as reflecting its non-adoption, however, which potentially creates limitations, as all experiences classified in this research as non-adoption may not reflect actual non-adoption (Alcouffe at al., 2019; Brierley, 2011). For example, having considered whether to adopt or not adopt ABC, companies who have not yet made their decision may either adopt it or reject it (Alcouffe et al., 2019). Consequently, these companies should be removed from any analysis under the three constructs suggested (Brierley, 2011). Future research is thus

[109] Further information concerning ABC adoption construct were discussed in chapter two, sub-section 2.2.1.1.

encouraged to reinvestigate the relationship between competition and ABC adoption taking into account the modified measurement of competition and focusing on ABC adoption constructs one, two, and three. Despite the investigation of numerous different independent constructs in this research, it may be preferable for future research to investigate a single construct in more depth, such as the influence of competition on ABC adoption or accounting for the size of the business unit as a possible control variable.

Competition, differentiation strategy and ABC adoption association

One set of interview results suggested that competition is an external factor that is not directly affected by ABC adoption, and that many companies may be price-takers, rather than price-makers (Aljabr 2020; Rankin, 2020; see chapter 6, section 6.4). However, this interviewee did suggest that competition could impact differentiation strategies. Tuanmat and Smith (2011) also identified that competition affects differentiation strategies, and companies operating within a competitive environment might adopt a differentiation strategy to enhance their level of product or service quality. As companies persistently work to identify original market opportunities, they must compete by offering unique products or services or by promoting full market development (Tuanmat and Smith, 2011). Thus, a differentiation strategy may mediate the relationship between competition and ABC adoption. Changing the model for the mediation relationship based on the views of one interviewee would not be justified, however, and to validate this opinion, future research should use a qualitative study to investigate these further practitioners.

Differentiation strategy - ABC usage and CSS association

The differentiation strategy was hypothesised as having a direct and positive relationship with ABC usage and CSS; however, this hypothesis was rejected on testing. Sub-sections 7.3.3.1.5

and 8.3.1.5 highlight that the measurement of differentiation strategy could offer a possible reason for this, as this was reduced to two items rather than three in order to solve issues relating to discriminant validity. By incorporating additional items, future research could benefit from re-investigating this relationship. According to Khedmati et al. (2018), product differentiation strategy can be measured using six items: research intensity, marketing, historical growth, operational efficiency, technological efficiency, and organisational stability.

On the other hand, two interviewees agreed with the quantitative results, noting that a differentiation strategy does not have a relationship with ABC usage and CSS; as it relates to marketing and sales rather than costing. When companies use differentiation strategies, they differentiate themselves through aspects other than cost. With just two supplementary interviews, further research could expand upon the qualitative research findings in order to verify these perspectives by enquiring as to whether the differentiation strategy affects ABC usage and CSS. If so, an initial exploratory sequential design may be advantageous to develop a measurement instrument for differentiation strategy in future quantitative research.

Cost leadership strategy - ABC adoption, ABC usage, and CSS association

The cost leadership strategy was hypothesised as being negatively related to ABC adoption, ABC usage, and CSS. However, no direct relationship between these factors was established. Some interviewees concurred with the quantitative results, stating that they did not believe that cost leadership strategy has a relationship with ABC adoption, ABC usage, and CSS due to companies using cost leadership strategies already effectively comprehending their cost structures. ABC or sophisticated costing systems would thus not add any value. On the other hand, one interviewee proposed that the cost leadership strategy has a greater likelihood of increasing ABC adoption, ABC usage, and CSS (see sub-sections 6.3.1.5, 7.3.3.1.3, and, 8.3.1.5, respectively), consistent with Drury and Tayles (2005), who argued that the complexity of costing systems such as ABC or CSS was potentially crucial for companies implementing cost leadership. Despite the diversity of opinions presented in the interviews, the qualitative results may provide a useful starting point for future studies asking whether the cost leadership strategy affects ABC adoption, ABC usage, and CSS.

Cost structure – ABC usage association

Cost structure was posited as having a direct and positive relationship with ABC usage (Baird, 2007; Baird et al., 2004). However, the field interviews provided surprising results, (see sub-section 7.3.3.1.3), as cost structure did not affect ABC usage in this thesis. It is thus necessary for future work to re-investigate this relationship based on considering the reasons and conditions relevant to this relationship. A mixed-methods (exploratory sequential design) approach may prove advantageous for developing a cost structure measurement instrument to be used in prospective quantitative research.

Possible contingent factors – ABC adoption, ABC usage and CSS association

The hypotheses regarding the relationship between size and ABC adoption, ABC usage, and CSS were all rejected (see sub-sections 6.3.1.9, 7.3.3.1.9, and 8.3.1.8, respectively). Business unit size was measured according to the number of employees and sales revenue, and all of the interviews suggested that business size does not affect a company's ABC adoption decisions, although other variables may affect ABC adoption, ABC usage, and CSS. The field interview results illustrated that financial resources, rather than size, impact ABC adoption, ABC usage, and CSS, as discussed in sub-sections 6.3.1.9, 7.3.3.3, and 8.4.2, respectively. Rankin (2020) also suggested that more research is required to evaluate the relationship between financial resources and ABC adoption. Financial resources may be quantified based on cash flow, debt capacity, and equity availability (Shapiro, 1999), and future research should expand upon this by conducting an exploratory sequential design or qualitative study with service providers with the objective of verifying these suppositions. Qualitative research offers the opportunity to improve the development of theoretical reasoning pertaining to possible relationships between financial resources, and ABC adoption, ABC usage, and CSS. The exploratory sequential design also offers the opportunity to develop a financial resources measurement instrument to be adopted in future quantitative research.

The field interviews also revealed potential contingent factors that were omitted from the original ABC adoption, ABC usage and CSS models. The most significant variable related to ABC adoption, ABC usage and CSS from a practical perspective was thus identified as top management support (Al-Sayed and Dugdale, 2016; Baird et al., 2007; Brown et al., 2004; Krumwiede, 1998) as detailed in sub-sections 6.4, 7.3.3.3, and 8.4.3. To confirm these opinions, future research should conduct a qualitative study in relation to service providers on this topic.

The interviewees also indicated that service complexity may affect ABC adoption and CSS more than size, as presented in sub-sections 6.3.1.9 and 8.3.1.8. As only a few perceptions were identified through the supplementary interviews, further prospective research would offer an opportunity to expand on these results to enable the verification of these perspectives by asking whether service complexity affects ABC adoption and CSS.

Finally, the field interviews revealed potential contingent factors that had been omitted from the original ABC adoption and CSS models, with the main significant omitted variable relating to ABC adoption was identified as an ERP system (see section 6.4). Rankin (2020) also suggested that further research is needed to evaluate the relationship between ERP systems and ABC adoption. The significant omitted variable related to the CSS model was identified as organisational complexity (see sub-section 8.4.4). To confirm these opinions, future research should take the form of a qualitative study in relation to service providers.

Service cycle time reduction – financial performance association with ABC adoption, ABC usage and CSS models

The current research failed to find a significant relationship between service cycle time reduction and financial performance for ABC adoption, ABC usage and CSS models (see sub-sections 6.3.2.4, 7.3.3.2.4, and 8.3.2.4, respectively). However, the field interviews anticipated a relationship between these variables. A key benefit of service cycle time reduction is the strengthening of financial performance (Maiga and Jacobs, 2008). However, as hypothesised in this thesis, service cycle time reduction does not mediate the relationship between ABC adoption, ABC usage, and CSS with financial performance. Thus, it is important for future work to re-investigate this relationship by analysing the reasons and conditions pertinent to such a relationship emerging. An exploratory sequential design may be beneficial for devising a measurement instrument for service cycle time reduction, which could then be adopted in future quantitative research.

ABC adoption and CSS – possible performance variables association

The field interviews revealed several potential outcome variables omitted from the original ABC adoption and CSS models. The most significant outcome variable for ABC adoption and CSS was identified as employees' satisfaction with costing systems (see sub-sections 6.5 and 8.5.1, respectively), particularly in terms of the mediation role that employees' satisfaction plays between CSS and financial performance (see sub-section 8.5.1). The interviewees also suggested that the quality of decision-making can be affected by ABC adoption and CSS (see section 6.5 and section 8.5.2, respectively), a variable also suggested in other recent research (Ditkaew and Pitchayatheeranart, 2019; Tamara et al., 2020). Conducting a qualitative study with service providers to verify these suppositions should therefore be an integral part of future research. Qualitative research may thus enhance the development of theoretical reasoning pertaining to the potential relationships between ABC adoption and CSS; employees' satisfaction with costing systems; and ABC adoption and CSS' relationships with the quality of decision-making.

The effect of environmental factors on costing systems

The current research asked interviewees whether environmental variables affect costing systems; they acknowledged only financial resources as such an internal environmental variable (Rotefoss and Kolvereid, 2005),[110] as discussed above. The majority of variables identified by the interviewees pertain to organisational factors (top management support, service complexity, and organisational complexity). Regardless, environmental variables are significant because they are phenomena external to companies that can nevertheless potentially affect MASs (Krumwiede, 1998). Future UK-focused research should consider environmental variables' effects on costing systems, particularly in light of the UK government's establishment of a target of being carbon neutral by 2050. Environmental factors have been a problem for the UK for many years, and the UK government aims to decrease greenhouse gas emissions by 80% by 2050 (Roger, 2019; Seddon et al., 2020). As Tsai et al. (2012) explained, to convey the final product's genuine cost, environmental protection responsibility must be incorporated into pre-production business activities. Tsai et al. (2012) thus suggested that, compared to that offered by TCSs, more precise assessment of the final product's environmental costs and waste discharge may be made via the ABC system: "The method [ABC], therefore, can provide information for use in existing environmental accounting systems and help managers incorporate environmental costs into their decision-making

[110] Financial resources are example of the internal environment factors becoust they exist within or inside the organisation.

processes"(Tsai et al., 2012, p. 102). Thus, further research specifically focused on the UK must also consider the extent to which costing systems must change as a consequence of environmental requirements, as well as what form such changes may take; these might include adopting ABC, increasing the adoption of AM techniques, or increasing the number of cost pools and cost drivers.

The effect of the coronavirus (Covid-19) pandemic on costing systems

This current research's data collection process involved a survey questionnaire and supplementary interviews undertaken between 2018 and 2019, all of which were completed prior to the coronavirus pandemic. The coronavirus pandemic began in China in December 2019 (Fernandes, 2020), and its spread is currently continuing internationally (Fernandes, 2020). The coronavirus pandemic and related responses, such as countrywide lockdowns and social distancing, have detrimentally affected businesses across the world (Reeves et al., 2020), and future research should thus also consider the coronavirus pandemic's effects on costing systems. As a result of social distancing requirements, non-manufacturing companies are beginning to transform how they offer services, and further research may also need to consider the extent to which such transformations in work processes could affect adoption of AA, ACA and ABC, as well as considering the extent to which these changes are likely to become permanent once the pandemic has ended, and the extent to which they might affect adoption of ABC or increased CSS.

9.8 Conclusion

This thesis' main contribution has been its extension of extant research into costing systems by using the contingency theory mediation form of fit. This research developed comprehensive models to test the effect of contingent factors on costing systems, as well as to test costing systems' effects on non-financial and financial performance within UK non-manufacturing industry. This research thus aimed to facilitate the provision of a proper understanding of AM usage and CSS combined with ABC adoption. AM usage was defined with regard to three different intensity levels (AA, ACA, and ABC usage), while, CSS adopts a far broader approach to analysing cost systems ranging from simple to highly sophisticated.

The thesis' results are outlined in three main aspects: (1) ABC adoption; (2) AM usage; and (3) CSS. Although the conclusions and discussion were thus presented separately for these in chapters 6, 7, and 8 respectively, supplementary interview results were drawn on collectively as recommendations for future qualitative and mixed methods research. It is thus anticipated that this study will stimulate other researchers to conduct further research in these areas.

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Appendices 1: Summary of costing systems studies

Appendix 1.1: Studies in activity-based costing (ABC) adoption

(Adapted from Alshamlan, 2018)

Authors	Country	Industry	Research method	Sample size	Response rate	ABC adoption rate	Definitions of ABC adoption	Definitions of ABC non-adoption	Contingent factors used	Contingent factors influenced ABC adoption	Performance measure used
Jusoh and Miryazdi (2015)	Iran	Manufacturing	Questionnaire	400	75%	11%	• Used occasionally • Used frequently • Used extensively	• Not considered adopted ABC • Considered ABC then rejected • Considering adopting ABC • Implemented ABC then abandoned	• Information technology • Cost structure • Product diversity • Competition • Business strategy • Organisational size	• Competition • Product diversity • Organisational size • Cost structure	Not studied
Elhamma and Fei (2013)	Morocco	Manufacturing and non-manufacturing	Questionnaire	Not stated	Not stated	12.9%	• ABC adopters	• Non-ABC adopters	• Business strategy	• Business strategy	• Competitiveness • Profitability • Productively
Brierley (2011)	UK	Manufacturing	Questionnaire	854	32.79%	3.5%	• Currently adopt ABC	• "Not using ABC, but have considered using it" • "Not using ABC, but have considered using it excluding those that are intending to use it" • "Rejected ABC and have not used ABC previously or do not adopt ABC principles" (P.225)	• Competition • Organisational size • Cost structure • Product customisation	• Competition • Organisational size • Cost structure	Not studied
Cohen et al. (2005)	Greek	Manufacturing, retail and non-manufacturing	Questionnaire	570	46.5%	40.9%	• ABC adopters	• Supporters • Deniers • Unawares	• Competition • Organisational size • Cost structure	• Competition • Organisational size • Cost structure	• "Cost accounting" • "Cost management" • "Performance measurement" • "Decision making" • "General management"

											• "Relationships management" (p.989)
Khalid (2005)	KSA	Listed companies	Questionnaire	100	39%	33.3%	• Presently adopt ABC	• Presently considering ABC • Rejected after evaluation • Never considered ABC adopting • Abandoned ABC after adopting it	• Product diversity • Organisational • Size • Cost structure	• Product diversity • Organisational size • Cost structure	Not studied
Brown et al. (2004)	Australia	Manufacturing and non-manufacturing	Questionnaire	1,279	12.5%	Not stated	• Evaluated ABC then rejected it • Evaluated ABC and approved for implementatio n it • Analysis • Getting acceptance for adopting ABC • Implemented ABC then abandoned • Restricted use ABC • Use somewhat • Used ABC extensively	• Not considered ABC • Considered ABC • Initiated/ evaluated	• Size • Use of consultants • Top management support • Internal support • Product complexity • Company product diversity • Cost structure	• Product diversity • Organisational size • Cost structure	Not studied
Schoute (2004)	Dutch	Manufacturing	Questionnaire	2,108	10.34%	17.8%	• Currently using ABC • Currently implementing ABC	• Currently considering adopting of ABC • Not yet considering adoption of ABC • Rejected ABC after assessment	• Formalisation • Centralisation • Competitive strategy • Size • Differentiation • Product diversity • Product line • Structure of production process • Competition	• Competition • Product diversity • Competitive strategy • Organisational size	Not studied

									• Perceive environment uncertainty		
Cagwin and BouwtHE man (2002)	US	Manufacturing and non-manufacturing	Questionnaire	1058	21.8%	31.8%	• Use of ABC for decision-making	• Not use of ABC • Implementation stage of ABC	2. "Importance of costs" 3. "Information technology sophistication" 4. "Business unit's complexity" 5. "Level of intra-company transaction" 6. "Unused capacity" 7. "Competition" 8. "Size" 9. "Type of company" (p.5)	• Competition • Product diversity • Organisational size	ROI Sales
Ittner (1994)	US	Manufacturing	Questionnaire	25,361	11%	26%	• Used ABC extensively	Non-ABC used	Not studied	Not studied	• ROA • Quality • Time • Cost
Clarke and Mullins (2001)	Ireland	Non-manufacturing	Questionnaire	395	16.20%	19%	• Currently adopt ABC	• Currently assessing ABC • Not currently adopt ABC but may considered it in the future • Considered but rejected ABC • Not considered ABC	Not studied	Not studied	• The analysis of profitability analysis • Cost causation in company • Cost control in company • Cost reduction • Improvement of making decision • Accuracy of service costs and pricing • Satisfaction with cost systems
Innes and Mitchell (1995)	UK	Manufacturing, non-manufacturing and Financial	Questionnaire	1000	44.9%	17.5%	• Currently adopt ABC	• Currently consider ABC • Reject ABC • No consideration	• "Top management support" • "Consultants involved" • "In-house accountants involved"	Not studied	ABC success: • "Cost reduction and cost management" • "Product or service pricing" • "Activity performance

									• "Production personnel involved" • "Systems personnel involved" • "In manufacturing sector" • "In finance sector" • "How long ABCM has been used" (p.357)		Measurement and Improvement" • "Cost modelling" • "Budgeting" • "Customer profitability analysis" • "Product or service output decisions" • "New product or service design" (p.357)
Malmi (1999)	Finland	Manufacturing and non-manufacturing	Questionnaire	690	41.6%	Not stated	• Either used ABC or ABM • Currently implemented ABC	Not stated	• Company Size • Cost structure • Strategy used in the company • Competition • Products /services diversity • Type of products	• Competition • Product diversity • Business Strategy • Size of operating units • Cost structure	Not studied
Krumwiede (1998)	US	Manufacturing	Questionnaire	778	31%	24.4%	• Approved for ABC implementation • Analysis level • Getting acceptance level • Implemented ABC then abandoned • Use somewhat • Used ABC extensively	• Not considered adopting ABC • Considered adopting ABC • Considered ABC then rejected	• Top management support in the company • Non-accounting ownership in the company • Clarify of objectives • Training level • Number of purposes • Cost distortion • Usefulness of cost information • Quality management • Lean production systems • Information technology quality • Type of production	• Cost Structure • Size of operating units	Not studied

Bjørnenak (1997)	Norway	Manufacturing	Questionnaire	132	57%	40%	• Implemented ABC • Currently implemented ABC • Planned to implement ABC	• Not wanted to adopt ABC • Not decided yet	• Company cost structure • Level of competition • The company existing costing system • Company product diversity • Size of operating units	• Competition • Product diversity • Size of operating units • Cost structure	Not studied
Van Nguyen and Brooks (1997)	Australia	Manufacturing	Questionnaire	350	34.3%	21.7%	• Currently used ABC • Planned for adopting ABC in the future • Adopted ABC then abandon it but plan to use it again	• Not planned to adopt ABC	• Company cost structure • Company production complexity • Company production diversity • size • Competitive intensity	• Competition • Product diversity • Size of operating units • Cost structure	Not studied

Appendix 1.2: Studies in activity management (AM) usage

(Adapted from Alshamlan, 2018)

Authors	Country	Industry	Research method	Sample size	Response rate	ABC adoption rate	Definitions of AM usage	Contingent factors used	Contingent factors influenced AM usage	Performance measure used
Askarany et al. (2010)	New Zealand	Manufacturing and non-manufacturing	Questionnaire	366	39.5%	8.7%	• AA • ACA • ABC	• Size • Industry type	• Size	Not studied
Baird (2007)	Australia (Public companies)	Manufacturing and non-manufacturing	Questionnaire	250	48.4%	66.3%	• AA • ACA • ABC	• Decision usefulness of cost information • Business unit size • Extent of information use • Company team orientation • Innovation • The attention to detail compensation • Company outcome orientation	• Organisational size	Not studied
Baird et al. (2004)	Australia (Private companies)	Manufacturing and non-manufacturing	Questionnaire	400	61.5%	78.1%	• AA • ACA • ABC	• Decision usefulness of cost information • • Business unit size • Product diversity • Cost structure • Extent of information use • Company team orientation • Innovation • The attention to detail compensation • Company outcome orientation	• Organisational size	Not studied

Gosselin (1997)	Canada	Manufacturing	Questionnaire	415	39%	47.8%	• AA • ACA • ABC	• Strategy • Organisational structure	• Competitive strategy	Not studied

Appendix 1.3: Studies in cost system sophistication (CSS)

(Adapted from Alshamlan, 2018)

Authors	Country	Industry	Research method	Sample size	Response rate	ABC adoption rate	Definitions of CSS	Contingent factors used	Contingent factors influenced CSS	Performance measure used
Ismail and Mahmoud (2012)	Egypt	Manufacturing	Questionnaire	96	85%	20%	• ABC or non-ABC • The number of cost pools • The number of cost drivers	• Product diversity • Cost structure • Importance of company cost information • Competition	• Competition • Product diversity • Organisational size • Cost structure	• Quality • Time • Cost
Schoute (2009)	Dutch	Manufacturing	Questionnaire	2108	10.7%	Not stated	• Cost pools • Cost allocation bases • The nature of cost pools • The cost allocation bases	• Formalisation • Centralisation • Competitive strategy • Size • Differentiation • Product diversity • Product line • Structure of production process • Competition • Perceive environment uncertainty	• Competition • Competitive strategy • Product diversity • Organisational size	• Cost system intensity of use • The extent of which the cost system is used to make decisions
Brierley (2008a)	UK	Manufacturing and interview	Questionnaire	673	41.6%	Not stated	• The allocation of overhead to the company product costs • The inclusion of all costs in product costs • The understanding of production costs by the company non-accountants	Not studied	Not studies	Not studied
Al-Omiri and Drury (2007)	UK	Manufacturing companies and non-manufacturing	Questionnaire	1000	19.6%	29%	• Number of cost pools • Number of cost drivers • ABC vs. traditional costing systems • Direct vs. absorption costing systems	• "Importance of cost information" • "Product diversity" • "Cost structure"	• Competition • Product diversity • Organisational size • Cost structure	Not studied

								• "Intensity of the competitive "environment • "Size of the organization" • "The quality of information technology" • "Extent of the use of innovative management accounting techniques" • "Extent of use of lean production techniques (including JIT techniques) • Business sector" (p.405)		
Drury and Tayles (2005)	UK	Manufacturing, retail and non-manufacturing	Questionnaire and interview	631	30.1%	15%	• The number of cost pools • The types of costs drivers	• Competition • Product diversity • Organisation size • Cost structure • Degree of customisation	• Competition • Product diversity • Organisation size • Cost structure	Not studied
Abernethy et al. (2001)	Australia	Manufacturing	Interview	Not stated	Not stated	Not stated	• The number of cost pools • The nature of cost pools • The type of cost drivers	• Product diversity	• Product diversity	Not studied

Appendix 1.4: Costing systems and outcome measurements

(Adapted from Alshamlan, 2018)

Author	Country	Industry	The definition of cost systems	Mediator variables between costing systems and performance	Moderator variables between costing systems and performance	Type of performance measure	The measurement of performance	Findings
Schoute (2009)	Dutch	Manufacturing	• Cost pools • Cost allocation bases • The Nature of cost pools	1- Product plan purpose 2- Cost management purpose Items of measurement (yes, no scale): • Cost control and reduction • The prise of product • Company Performance measurement • Cost modelling • Measure the budget • Profitability analysis • Decision of product output • Design of new product • The Stock evaluation	Not studied	• Costing system intensity of use • The extent of which the costing system is adopted to make company decisions Satisfaction with costing system	One type question for each item A five-point Liker scales	• Negative relationship between product planning purpose, the costing system complexity and costing system intensity of adopt • Positive relationship between management of costs purpose, the costing system complexity and costing system intensity of adopt and satisfaction with costing systems
Baykasoğlu and Kaplanoğlu (2008)	Turkey	Non-manufacturing	ABC adoption vs. Traditional costing systems	Not studied	Not studied	• Service quality	Not stated	ABC can increase service quality

Cohen et al. (2005)	Greek	Manufacturing Retail and non-manufacturing	ABC adopters vs. ABC supporters ABC deniers ABC unawares	Not studied	Not studied	• Cost accounting • Cost management • Performance measurement • Decision making • General management • Relationships management The satisfaction with cost system	A five-point Liker scales • Cost accounting 1. "Calculation of actual total product costs" (p.990) 2. "Identification of activities' costs" (p.990) 3. "Cost accounting system update in order to be more accurate" (p.990) 4. "More accurate indirect cost allocation to products" (p.990) • Cost management 1. "Cost creation" (p.990) 2. "Overhead decrease" (p.990) 3. "More realistic budget preparation" (p.990) 4. "Cost reduction" (p.990) • Performance measurement 1. "Analysis and control of product profitability" (p.990) 2. "Improvement of department's performance measurement" (p.990) 3. "Improvement of activities' management efficiency" (p.990) 4. "Improvement of activities' performance" (p.990) • Decision making 1. "Improvement of the decision-making process in relation to product costs" (p.990) 2. "Improvement of the decision-making process in relation to preservation or discontinuance of activities" (p.990) 3. "Adjust pricing policy as to apply to increases	• ABC implementation gave companies certain advantages, such as accurate cost calculation, decision-making, performance measurement. ABC supporters had less satisfaction with their costing systems than deniers and those who were unaware of ABC

							product mix complexity" (p.990) 4. "Abolition of loss making products" (p.990) 5. "Changes of product mix in order to better suit customer needs from a value for money perspective" (p.990) • General management 1. "Improvement of product quality" (p.990) 2. "Improvement of outsourcing decision procedures" (p.990) 3. "Attainment of synergies with total quality systems" (p.990) 4. "Attainment of synergies with just in time systems" (p.990) • Relationships management 1. "Improvement of customer's management efficiency" (p.990) 2. "Motivation of the personnel that deals with cost accounting" (p.990) 3. "Identification of "loss making" customers Identification of "loss making" suppliers" (p.990)	
Cagwin and Bouwman (2002)	US	Manufacturing and non-manufacturing	ABC Adoption • Currently adopt ABC Non-ABC adoption • Not adopt ABC • Implementation stage of ABC	Not studied	1. Information technology 2. Competition 3. Complexity of firm process 4. Importance of costs 5. Intra-company transaction 6. Low used capacity	ROI	• Moderator variables (A five-point Liker scales) 1. 6 items 2. 1 item (price competition) 3. 7 items 4. 6 items 5. 2 items 6. 1 item • ROI	Significant relationship if moderating variables are tested

							(A five-point Liker scales) for two items: ROI over 3 and 5 years	
Ittner et al. (2002)	US	Manufacturing	Adopt ABC vs. Non-ABC adapted	Not studied	Not studied	• Plant performance: 1. ROA • Operational performance: 1. Quality 2. Time 3. Change in manufacturing cost	• ROA-not stated • Quality- the average of two questions: 1. “Finished product first pass quality in percentage term” (p.714) 2. “Scrap and rework cost as a percentage of sales” (p.714) • Cycle time- the average of two questions: 1. “Manufacturing cycle time from start of production to completion of production in hours” (p.715) 2. “Standers lead-time from order entry to shipment in day” (p.715) • Chang in total manufacturing costs-excluding the cost of raw materials over the last 5 years	• Significant correlation between ABC adoption and product quality and cycle time • Not significant correlation between ABC adoption and ROI and changing in manufacturing costs
Clarke and Mullins (2001)	Ireland	Non-manufacturing	ABC Adoption • Currently adopt ABC Non-ABC adoption • Currently assessing ABC • Not currently adopt ABC but may considered it in the future • Considered but rejected ABC	Not studied	Not studied	• Six advantages of ABC adoption: • Profitability analysis control • Cost causation for companies • Cost reduction and control • Improvement for making decision • Accuracy of service costs and pricing	• Objective for the six items	• For the six advantages of ABC: • ABC adoption (70%) vs. Non- ABC adoption (39%) • ABC adoption (60%) vs. Non- ABC adoption (55%) • ABC adoption (60%) vs. Non- ABC adoption (45%) • ABC adoption (60%) vs. Non- ABC adoption (43%)

			• Not considered ABC			• Satisfaction with cost systems	• A ten-point Liker scales	• ABC adoption (60%) vs. Non- ABC adoption (45%) • ABC adoption (50%) vs. Non- ABC adoption (57%) • Satisfaction levels: Low satisfaction (22%) Medium satisfaction (33%) High satisfaction (44%)
Fei and Isa (2010)	China	Manufacturing	Only ABC users	ABC success	Not studied	• Manufacturing performance: • Quality • Time • Cost • Company performance: • Productivity of the business unit • Costs of the business unit • Quality of products • Service • Total Profit • Total od Sales volume • Total of market volume	• A five-point Liker scales	Significant
McGowan and Klammer (1997)	US	Manufacturing and non-manufacturing	• Prepare ABCM vs. use ABCM	Not studied	Not studied	• The satisfaction of employees with ABCM	One item (a five-point Likert scales)	• Significant

Appendix 1.5: Comparisons studies testing the relationship between competition and costing systems[a]

(Adapted from Alshamlan, 2018)

Competition and ABC Adoption studies			
Authors	Basis for competition measure	Measurement method	Findings
Jusoh and Miryazdi (2015)	• Number of competitors	Five scales: 1= no competitors 2= 1-3 3= 4-10 4= 11-20 5= more than 20 competitors	Significant
Brierley (2011)	• General competition for the main company products • Expected competition in the next two years for the main products.	A five- point Likert scales	Not significant
Cohen et al. (2005)	• Intensity of competitors	Not stated	Not significant
Schoute (2004)	• Price competition • Product competition • Marketing competition	A five- point Likert scales	Not significant
Cagwin and Bouwman (2002)	• Price competition	A five- point Likert scales	Significant
Malmi (1999)	• Percentage of export sales • Perceived change in competition	• Objective • A scale variable from -2 to 2	Significant
Bjørnenak (1997)	• Percentage of sales export • Number of competitors for the major products	• Objective • A four- point Likert scales	• Not significant • Not significant

Van Nguyen and Brooks (1997)	• Ferocity of competition	Likert scales (not stated how many points)	Significant
Competition and AM studies			
Authors	Basis for competition measure	Measurement method	Findings
No studies			
Competition and CSS studies			
Authors	Basis for competition measure	Measurement method	Findings
Ismail and Mahmoud (2012)	• Competition • Competition for their products in the last 10 years • Competition of price	A five- point Likert scales	Not significant
Schoute (2009)	• Price competition • Product competition • Marketing competition	A five- point Likert scales	Significant
Al-Omiri and Drury (2007)	• Four items- not stated	A seven- point Likert scales	Significant for three dependent variables
Drury and Tayles (2005)	• Intensity of competition for the main products and price	A seven- point Likert scales	Not significant

[a] The measurements of ABC adoption, AM usage and CSS used in previous literature were presented in Appendix 1.1, 1.2 and 1.3, respectively.

Appendix 1.6: Comparisons studies testing the relationship between product diversity and costing systems[a]

(Adapted from Alshamlan, 2018)

Product Diversity and ABC Adoption studies			
Authors	Basis for product diversity measure	Measurement method	Findings
Jusoh and Miryazdi (2015)	Number of total products	• Five scales: 1 = less than five products 2 = 5-10 3 = 11-20 4 = 21-50 5 = more than 50 products.	Significant
Khalid (2005)	Number of products	Two groups: <5 products or >= 5 products	Significant
Brown et al. (2004)	• Product line • Process • Volume • Cost of support department for each product line	A seven-point Liker scales	Significant relationship with univariate logistic, not with multivariate logistic regression model
Schoute (2004)	• Number of different company products • size • complexity • Batch size	• Scale: log 2 N scale ranging from "1-2" to "> 512" A five-point Liker scales for the three items	Significant
Cagwin and Bouwman (2002)	• Size between products • Volume between products • Change of volumes of products • Cost of support department for each product line • Product lines	A five-point Liker scales	Significant

	• Products process • Change of product and services		
Malmi (1999)	Number of products	A five-point Liker scales	Significant
Bjørnenak (1997)	• Number of product/services variants • Degree of product customisation	• A four- point Likert scales • A five-point Liker scales	Not significant
Van Nguyen and Brooks (1997)	• Facility flexibility • Changes in products and designs • Product-volume variation • Product-complexity variation	A four-point Likert scales	Not significant
Product Diversity and AM studies			
Authors	Basis for product diversity measure	Measurement method	Findings
Baird (2007)	1) “Product lines are quite diverse.” (p.568) 2) “Most products require different processes to design, produce and distribute.” (p.568) 3) “There are major differences in volume/output across product lines.” (p.568) 4) “The consumption of support department (e.g., engineering, purchasing, marketing) resources varies quite substantially across product lines.” (p.568)	• A seven-point Liker scales	Significant only for ACA, and ABC
Baird et al. (2004)	1) “Product lines are quite diverse.” (p.396) 2) “Most products require different processes to design, produce and distribute.” (p.396) 3) “There are major differences in volume/output across product lines.” (p.396) 4) “The consumption of support department (e.g., engineering, purchasing, marketing) resources varies quite substantially across product lines.” (p.396)	• A seven-point Liker scales	Significant only for ABC level

Product Diversity and CSS studies			
Authors	Basis for product diversity measure	Measurement method	Findings
Ismail and Mahmoud (2012)	• Volume diversity 1) "Whether major differences exist in the sales volumes between the different products" (p.39) 2) "Whether considerable variation exists in the sales volume between the top 20% of the best-selling items and the bottom 20% of the lowest selling items" (p.39) • Support diversity 1) "Whether most products require similar resources to design, manufacture/provide and distribute" (p.39) 2) "Whether costs of the support department (e.g. purchasing, information processing, and marketing) resources consumed by each product line are the same" (p.39	• A five-point Liker scales for volume diversity	Not significant
Schoute (2009)	• Number of different products • Physical size • Product complexity • Batch size	• Scale: log 2 N scale ranging from "1-2" to "> 512" A five-point Liker scales for the three items	Significant
Al-Omiri and Drury (2007)	• Volume diversity • Support diversity	A seven-point Liker scales	Not significant
Drury and Tayles (2005)	"Variation existed in the consumption of support department overheads by their organization's different products or services" (p.68)	A seven-point Liker scales	Significant
Abernethy et al. (2001)	Number of product and the way in which the technology in companies is used to manage diversity	Not stated	Significant when moderating effects are included (advanced manufacturing technology-AMT)

[a] The measurements of ABC adoption, AM usage and CSS used in previous literature were presented in Appendix 1.1, 1.2 and 1.3, respectively.

Appendix 1.7: Comparisons studies testing the relationship between business strategy and costing systems[a]

(Adapted from Alshamlan, 2018)

Business Strategy and ABC Adoption studies			
Authors	Basis for business strategy measure	Measurement method	Findings
Jusoh and Miryazdi (2015)	Miles and Snow (1978) • Forty-eight items in 12 questions	A five-point Liker scales	Significant
Elhamma and Fei (2013)	Miles and Snow (1978) • Standardisation/ differentiation • Growth • Producing products • Developing of products • Risks and returns of investment in market • Strategy • Producing new products	A five-point Liker scales	Not significant
Schoute (2004)	Miles and Snow (1978) • "Produces products in innovation ways" (p.31) • "Offers a wide variety of products" (p.31) • "Has a very diverse customer group" (p.31) • "Offers many new products" (p.31) • "Offers innovative new products" (p.31) • "Allots many Resources to marketing" (p.31)	A five-point Liker scales	Significant
Malmi (1999)	Porter (1980) • Cost leadership • Differentiation	No point liker scales question-only discerption their strategy, cost leadership or product defenestration.	Not significant
Business Strategy and AM studies			
Authors	Basis for business strategy measure	Measurement method	Findings
Gosselin (1997)	Miles and Snow (1978) • Prospectors • Defenders • Analysers	No point liker scales question-only discerption statements	Significant for prospectors (differentiation strategy)

		about the strategies: prospectors, defenders or analysers	
Business Strategy and CSS studies			
Authors	Basis for business strategy measure	Measurement method	Findings
Schoute (2009)	Miles and Snow (1978) • "Produces products in innovation ways" (p.224) • "Offers a wide variety of products" (p.224) • "Has a very diverse customer group" (p.224) • "Offers many new products" (p.224) • "Offers innovative new products" (p.224) • "Allots many Resources to marketing" (p.224)	A five-point Liker scales	Significant

[a] The measurements of ABC adoption, AM usage and CSS used in previous literature were presented in Appendix 1.1, 1.2 and 1.3, respectively.

Appendix 1.8: Comparisons studies testing the relationship between cost structure and costing systems[a]

(Adapted from Alshamlan, 2018)

Cost Structure and ABC Adoption studies			
Authors	Basis for cost structure measure	Measurement method	Findings
Jusoh and Miryazdi (2015)	• Percentage of over-head costs included in the cost of the company products	Five scales: 1 = less than 14%, 2 = 14-19%, 3 = 20-24% 4 = 25-29%, 5 = more than 29%	Significant
Brierley (2011)	• Percentage of manufacturing overhead/ indirect costs to total manufacturing costs	• Sum of material cost, labour cost and manufacturing overhead/ indirect cost percentages	Not significant
Cohen et al. (2005)	• Production and non-production overhead/ indirect costs contribution to total manufacturing costs	Not stated	Not significant
Khalid (2005)	• Percentage of Overhead costs	Two groups: From 0% to 20% From 20% to 50%	Not significant
Brown et al. (2004)	• Overhead as a percentage of value-added cost	Objective	Not significant
Malmi (1999)	• Capital related costs in total costs	Objective	Not significant
Krumwiede (1998)	• Percentage of overhead costs included in the production costs	Objective	Significant

Bjørnenak (1997)	• Overhead/ indirect costs compare to total costs	Objective	Significant
Van Nguyen and Brooks (1997)	• Overhead/ indirect costs compare to total manufacturing costs	Objective question	Not significant
Cost Structure and CSS studies			
Authors	Basis for cost structure measure	Measurement method	Findings
Baird (2007)	"The magnitude of overhead costs as a proportion of total product costs" (p.558)	A seven-point Liker scales	Significant only for ACA and ABC
Baird et al. (2004)	"The magnitude of overhead costs as a proportion of total product costs" (p.389)	A seven-point Liker scales	Significant only for ABC
Cost Structure and CSS studies			
Authors	Basis for cost structure measure	Measurement method	Findings
Ismail and Mahmoud (2012)	• Overhead/ indirect costs as a percentage of total manufacturing costs	Objective question	Not significant relationship
Al-Omiri and Drury (2007)	• Overhead/ indirect costs as a percentage of total manufacturing costs	Objective question	Not significant relationship
Drury and Tayles (2005)	• Overhead costs as a percentage of total manufacturing costs	Objective question	Not significant relationship

[a] The measurements of ABC adoption, AM usage and CSS used in previous literature were presented in Appendix 1.1, 1.2 and 1.3, respectively.

Appendix 1.9: Comparisons studies testing the relationship between size of the business unit and costing systems[a]

(Adapted from Alshamlan, 2018)

Organisational size and ABC Adoption studies			
Authors	Basis organisational size for measure	Measurement method	Findings
Brierley (2011)	• Annual sales revenue • Number of employees	Objective	Significant
Cohen et al. (2005)	• Sales revenue • Number of employee	Not stated	Not significant
Khalid (2005)	• Not stated	Not stated	Significant
Brown et al. (2004)	• Number of employees	Objective	Significant with univariate logistic regression model
Schoute (2004)	• Number of employees	Objective	Not significant
Cagwin and Bouwman (2002)	• Annual sales revenue	Objective	Significant
Malmi (1999)	• Turnover • Number of employees	Objective	Significant
Krumwiede (1998)	• Current annual sales revenue	Objective	Significant
Bjørnenak (1997)	• Number of employees	Objective	Significant
Van Nguyen and Brooks (1997)	• Sales dollars • Number of employees	Not stated	Significant

Organisational size and AM studies			
Authors	Basis organisational size for measure	Measurement method	Findings
Askarany et al. (2010)	• Number of employees	Six scales: 1= up to 25 employees 2= from 26 up to 50 3= from 51 up to 100 4= from 101 up to 200 5= from 201 up to 500 6= more than 500	Not significant
Baird (2007)	• Number of employees	Objective	Significant for only ABC level
Baird et al. (2004)	• Number of employees	Objective	Significant for only AA and ACA
Organisational size and CSS studies			
Authors	Basis organisational size for measure	Measurement method	Findings
Ismail and Mahmoud (2012)	• Number of employees	Objective	Not significant
Schoute (2009)	• Number of employees	Objective	Significant
Al-Omiri and Drury (2007)	• Annual sales turnover	Objective/ Seven scales	Significant
Drury and Tayles (2005)	• Annual sales turnover	Objective/ Seven scales:	Significant

[a] The measurements of ABC adoption, AM usage and CSS used in previous literature were presented in Appendix 1.1, 1.2 and 1.3, respectively.

Appendices 2: The questionnaire and letters accompanying the pilot study

Appendix 2.1: The pilot questionnaire (Adapted from Alshamlan, 2018)

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The Determinants of Costing Systems, and Costing Systems' Impact on Performance

This survey aims to obtain information that will be used to determine the factors that influence the adoption of activity-based costing systems, activity management usage and cost system sophistication and the effect of these costing systems on non-financial and financial performance. The responses you give are confidential. The number in the top right-hand corner is used to identify who has returned the questionnaire.

You should answer the questionnaire from the perspective of business unit that most clearly defines where you work (e.g. a head office of divisionalised company, a division of a divisionalised company, a non-divisionalised company, etc.). If you do not have a costing system to calculate the costs of your various services, please go to question C2 in the questionnaire.

As this is a pilot version of the questionnaire, please be prepared to comment on and suggest amendments to any of the questions, comment on the layout of the questionnaire, qualify answers to questions, suggest any other questions that should be included and indicate how long it took you to complete the questionnaire. You may make any comments in the margins or on the back cover.

When you have completed the pilot questionnaire, please return it to me in the enclosed stamped addressed envelope.

Thank you for your help and cooperation.

Sheffield University Management School
The University of Sheffield
Conduit Road
Sheffield
S10 1FL

Section A: The Costing System in Your Business Unit

<u>The following information relates to questions A1, A2 and A3</u>

Activity-based costing (ABC) assigns overhead costs to services through the following steps: (1) Identify the main activities and record overhead costs associated with each of these activities. (2) Identify the most relevant factor (i.e. cost driver) for each activity which causes the overhead costs recorded for that activity to be incurred. The cost driver is used to assign each activity's overhead costs to the services that are offered to customers.

(A1) Using the definition above, which of the following describes your business unit's experience with activity-based costing (ABC)? (Please circle the appropriate number.)

1. Have adopted ABC (please go to question A2).
2. Intending to adopt ABC (please go to question A3).
3. Investigating whether to adopt ABC (please go to question A3).
4. Intending to investigate whether to adopt ABC in the near future (please go to question A3).
5. Adopted ABC and decided subsequently to abandon it (please go to question A3).
6. Investigated whether to adopt ABC and decided to reject it (please go to question A3).
7. Have considered whether to adopt ABC, but did not investigate it and decided to reject it (please go to question A3).
8. Never considered whether to adopt ABC (please go to question A3).
9. Other (please specify) ____.

(A2) How long is it since your business unit adopted ABC?

Please write the number here (in years and months): __________________years and months.

(A3) Please indicate the extent to which the following statements describe current practices in your business unit's costing system? (Please circle the appropriate number.)

	Not at all	Small extent	Medium extent	Large extent	Very large extent
a. Our business unit identifies and analyses the various activities involved in providing services, but without recording their associated costs.	1	2	3	4	5
b. Our business unit identifies, analyses and records the costs of the various activities involved with providing services.	1	2	3	4	5
c. Our business unit identifies, analyses and records the costs of the various activities involved with providing services, and then uses this cost information to calculate the cost of each service provided.	1	2	3	4	5

<u>The following information relates to questions A4 and A5</u>

The typical procedure for assigning overhead costs to cost objects involves a two-stage process:

In the **first** stage, overheads are allocated to cost pools (or cost centres).

(A cost pool/centre represents a location, where a single or group of overhead costs are initially accumulated to later assign the overhead costs to cost objects, such as services provided.)

(A4) How many cost pools (or cost centres) are used in the costing system in your business unit?

Please write the number here: ______________________________cost pools (or cost centres).

In the **second** stage, the overhead allocation rate (or cost driver) for each cost pool (or cost centre) is identified and used to assign overhead costs to services.

(An overhead allocation rate (or cost driver) assigns the overhead costs from cost pools to the services. A cost driver also measures the service's consumption of resources.)

(A5) How many second stage overhead allocation rates (or cost drivers) are used to assign overhead costs accumulated in cost pools (or cost centres) to services? *(If you do not have any second stage allocation rates (or cost drivers), then you should report zero.)*

Please write the number here: _________________ overhead allocation rates (or cost drivers).

<u>The following information relates to question A6</u>

Volume overhead allocation rates (or volume cost drivers) (e.g. labour costs and labour hours) assume that overhead costs are consumed each time a service is performed. On the other hand, **non-volume overhead allocation rates** (or non-volume cost drivers) (e.g. number of service design changes and hours devoted to service quality control) are not necessarily performed each time a unit of a service is performed.

(A6) Given the explanation above, can you divide the total number of second-stage overhead allocation rates (or cost drivers) you reported in question (A5) into volume and non-volume overhead allocation rates (or cost drivers).

Please write the number here: _______volume overhead allocation rates (or cost drivers).

Please write the number here: _______non-volume overhead allocation rates (or cost drivers).

Section B: Your Business Unit's Environment

(B1) What level of competition has your business unit faced in each of the following areas? (Please circle the appropriate number.)

	None or not at all	Small level	Medium level	High level	Very high level
a. The intensity of competition for the major services provided.	1	2	3	4	5
b. Our suppliers have the ability to negotiate higher prices with our business unit.	1	2	3	4	5
c. Our customers have the ability to negotiate lower prices with our business unit.	1	2	3	4	5
d. The degree to which our business unit is threatened by substitute services.	1	2	3	4	5

(B2) To what extent does your business unit emphasise each of the following strategies? (Please circle the appropriate number.)

	Not at all	Small extent	Medium extent	High extent	Very high extent
a. We seek to maintain brand identification.	1	2	3	4	5
b. We seek to be unique in our industry and find that buyers are willing to pay a premium price for that uniqueness.	1	2	3	4	5
c. We invest in technology to develop unique service designs.	1	2	3	4	5
d. We seek to be the lowest cost service provider in our industry.	1	2	3	4	5
e. We place considerable emphasis on reaping cost advantages from all services.	1	2	3	4	5
f. We invest in technology to develop low-cost service designs.	1	2	3	4	5

(B3) What level of service diversity has your business unit provided for each of the following areas? (Please circle the appropriate number.)

	Not at all	Small level	Medium level	High level	Very high level
a. Our business unit requires different processes to design services.	1	2	3	4	5
b. Our business unit requires different processes to provide services.	1	2	3	4	5
c. Our business unit has differences in the volume of services provided across different services.	1	2	3	4	5
d. Our business unit has differences in the volumes of services provided across different service segments.	1	2	3	4	5

(B4) Please indicate your level of agreement about the reduction in service cycle time in your business unit? (Please circle the appropriate number.) (If you are not familiar with the subject of this question, you can consult the operation managers in your business unit.)

	Not at all	Small level	Medium level	High level	Very high level
a. Our business unit simplifies the process methods of work to reduce the time associated with value-added activities.	1	2	3	4	5
b. Our business unit simplifies the process methods of work to reduce the time associated with non-value-added activities.	1	2	3	4	5
c. Our business unit invests in new technology to reduce the time associated with value-added activities.	1	2	3	4	5
d. Our business unit invests in new technology to reduce the time associated with non-value-added activities.	1	2	3	4	5

(B5) Please indicate your level of agreement about the level of service quality in your business unit? (Please circle the appropriate number.) (If you are not familiar with the subject of this question, you can consult the operation managers in your business unit.)

	Not at all	Small level	Medium level	High level	Very high level
a. Our business unit has the required skills and knowledge to perform services.	1	2	3	4	5
b. Our business unit performs services properly first time and honours its promises.	1	2	3	4	5
c. Our business unit aims to keep our customers informed about when services will be performed.	1	2	3	4	5
d. Our business unit provides easily accessible services.	1	2	3	4	5
e. Our business unit has convenient locations for service facilities.	1	2	3	4	5
f. Our business has convenient operating hours.	1	2	3	4	5
g. Our business unit's customers feel safe with their transactions with our business unit.	1	2	3	4	5
h. Our business unit readily responds to customers' requests.	1	2	3	4	5

(B6) To what extent has your business unit experienced a reduction in the following costs? (Please circle the appropriate number.)

	No reduction	Small reduction	Medium reduction	High reduction	Very high reduction
a. Direct service costs.	1	2	3	4	5
b. Indirect service costs.	1	2	3	4	5

(B7) To what extent has your business unit experienced an improvement in its financial performance using the following performance measures? (Please circle the appropriate number.)

	No improvement	Small improvement	Medium improvement	Large improvement	Very large improvement
a. Net sales (operating revenue earned by our business unit for rendering our services).	1	2	3	4	5
b. Return on investment (net profit from investments divided by the cost of the investment).	1	2	3	4	5
c. Return on assets (net profit divided by total assets).	1	2	3	4	4

Section C: Demographics and Firm Characteristics

(C1) For your business unit, please provide an approximate percentage breakdown of your cost structure by entering the percentages in the appropriate spaces below:

a. Direct costs that can be traced directly to services.	%
b. Indirect service-based costs that cannot be traced directly to services.	%
c. Non-service-based costs (e.g. administration costs) that cannot be traced directly to services.	%
Total costs.	100 %

(C2) a. What is the approximate number of employees and accountants in your business unit?

Please write the number her: _______________ employees, ________________ accountants.

b. What was the approximate annual sales revenue of your business unit in the last financial year?
Please write the amount here: ____ pounds.

c. What was the approximate capital employed (net assets) of your business unit in the last financial year?
Please write the amount here: ____ pounds.

(C3) Please briefly describe the service sector of your business?
____.

Is there anything else you would like to say about the questionnaire or the costing of services? (If so, please use the space below and/or a separate sheet of paper.)

Would you like to receive a summary of the research's results? (If yes, please provide your name, e-mail address and telephone number below.) Yes No

As part of this research, would you be willing to answer questions about the questionnaire design in a face-to-face interview? (If yes, please provide your name, e-mail address and telephone number below.)

Yes No

Your Name: ____.

E-mail address: ____.

Telephone Number: ____.

Your contribution of this research effort is greatly appreciated.

Appendix 2.2: Consent form for the pilot questionnaire

Title of Research Project: The Determinants of Costing Systems, and Costing Systems' Impact on Performance
Researcher: Hanadi Alshamlan
PhD Researcher at Sheffield University Management School
E-mail: hmalshamlan1@sheffield.ac.uk Mobile No:
Participant Identification Number for this Project:

Please initial each box to indicate that you agree with each of the six statements.

1. I confirm that I have read and understand the participant information sheet explaining the above research project and I have had the opportunity to ask questions about the project. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences for me. In addition, should I not wish to answer any particular question or questions, I am free to decline from answering them. ☐

3. I understand that my responses will be kept strictly confidential. I give permission for the researcher to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that results from the research. ☐

4. I agree for the data collected from me to be used in the PhD research project. No names will be disclosed under any circumstances in PhD research project. ☐

5. I agree for the anonymised data collected from me to be used in future research (e.g. the publication of conference papers and for the publication of articles in academic journals). No names will be disclosed under any circumstances in the conference papers and journal articles. ☐

6. I can contact the researcher by her e-mail if I have any concerns or questions about any aspect of the research. ☐

7. If I am unhappy about any aspect of the research process, please contact the research supervisor, Dr John Brierley, and feel free to e-mail him at j.a.brierley@sheffield.ac.uk. ☐

8. I agree to take part in the pilot research project. ☐

________________________	________________________	________________________
Name of participant	Date	Signature
Hanadi Alshamlan		
Principal Researcher	Date	Signature

Appendix 2.3: Participant information sheet for the pilot questionnaire

Researcher

Hanadi Alshamlan
PhD Researcher at Sheffield University Management School
Mobile No:
E-mail: hmalshamlan1@sheffield.ac.uk

Purpose of the research

You have been selected from the Financial Analysis Made Easy (FAME) database to take part in the pilot test of a research questionnaire that looks at the type of cost systems used by UK non-manufacturing companies. Specifically, the research examines which contingent variables are associated with the adoption of activity based costing (ABC), activity management and cost system design, and how these influence financial and non-financial performance.

What will you be asked to do?

The researcher will ask the participant to complete the pilot questionnaire and return it in the enclosed stamped-addressed envelope.

What data will be collected?

The aim of the questionnaire is to collect quantitative data. The researcher will collect the questionnaire data by post. The questionnaire will consist of a number of questions concerning the costing systems that are adopted in their business units, alongside the variables that can affect costing systems. Furthermore, the research seeks to test how costing systems affect performance by including questions relating to the measurement of non-financial and financial performance.

What will happen to the questionnaire data?

The researcher will review the completed pilot questionnaires including any comments or suggestions made by the respondents to see what revisions should be made to the questionnaire that will be used in the main survey.

What rights do you have?

Your participation in the pilot questionnaire is voluntary and the responses you give are confidential. You can withdraw at any time without giving any reason and you can decline to answer any of the survey questions. If you are unhappy about any aspect of the research process, please contact the research supervisor, Dr John Brierley, and feel free to e-mail him at j.a.brierley@sheffield.ac.uk

Appendix 2.4: Advance letter for the pilot questionnaire

Potential respondent's address

4th June 2018

Dear Sir/Madam,

You have been selected to take part in the pilot test of a research questionnaire that indicates the type of cost systems used by UK non-manufacturing companies. The research examines which contingent variables are associated with the adoption of activity based costing (ABC), activity management, and cost system design, and how these influence financial and non-financial performance.

Your company has been identified by using the Financial Analysis Made Easy (FAME) database, which consists of information about UK companies, including their location, type of industry and size.

The pilot testing of the questionnaire is part of my PhD research at the University of Sheffield. I would be grateful for your participation in this research project that will help to improve the quality of the questionnaire. You will receive the pilot questionnaire in the post in two weeks' time. I would be grateful if you would please complete the pilot questionnaire and questionnaire consent form and return them to me as soon as possible.

If you have any questions or concerns about the pilot research questionnaire, please feel free to e-mail me at hmalshamlan1@sheffield.ac.uk

Thank you for your help and cooperation.

Yours faithfully,

Hanadi Alshamlan
PhD researcher
Sheffield University Management School

Appendix 2.5: Cover letters for the pilot questionnaire

Potential respondent's address

18th June 2018

Dear Sir/Madam,

As promised in my letter of 04 June 2018, I enclose a copy of the pilot research questionnaire about the cost systems used by UK non-manufacturing companies. The pilot research questionnaire includes questions about:

- Activity-based costing (ABC), activity management, and cost system design.
- Factors that affect the adoption of costing systems.
- The influence of costing systems on business units' non-financial and financial performance.

The management accountant in your business unit should complete this research questionnaire. However, please feel free to share this research questionnaire with other knowledgeable persons in your business unit to assist in providing accurate answers. I would be grateful if you would please complete the pilot research questionnaire and provide comments and possible amendments to the design of the questions included in the pilot questionnaire. Your answers are confidential. It would be helpful if you can please return the pilot questionnaire and questionnaire consent form to me as soon as possible in the enclosed stamped-addressed envelope. The number in the top right-hand corner of the questionnaire is used to determine who has returned it.

If you have any questions or concerns about the pilot research questionnaire, please feel free to e-mail me at hmalshamlan1@sheffield.ac.uk

Thank you for your help and cooperation.

Yours faithfully,

Hanadi Alshamlan
PhD researcher
Sheffield University Management School

Appendix 2.6: First follow-up letter for the pilot questionnaire

Potential respondent's address

2en July 2018

Dear Sir/Madam,

About two weeks ago I sent you a pilot research questionnaire about the cost systems used by UK non-manufacturing companies. The pilot research questionnaire includes questions about:

- Activity-based costing (ABC), activity management, and cost system design.
- Factors that affect the adoption of costing systems.
- The influence of costing systems on business units' non-financial and financial performance.

If you have already returned the pilot research questionnaire, then please accept my sincere thanks. If not, I would be grateful if you would please complete the pilot research questionnaire and questionnaire consent form, and return them to me as soon as possible in the enclosed stamped-addressed envelope. Your answers are confidential. The number in the top right-hand corner of the questionnaire is used to determine who has returned it.

If you have any questions or concerns about the pilot research questionnaire, please feel free to e-mail me at hmalshamlan1@sheffield.ac.uk

Thank you for your help and cooperation.

Yours faithfully,

Hanadi Alshamlan
PhD researcher
Sheffield University Management School

Appendix 2.7: Second follow-up letter for the pilot questionnaire

Potential respondent's address

16th July 2018

Dear Sir/Madam,

I have recently sent you a pilot questionnaire related to my PhD research project at the University of Sheffield. Unfortunately, as of today, I have not received your completed pilot questionnaire. The pilot research questionnaire is about the cost systems used by UK non-manufacturing companies. The pilot research questionnaire includes questions about:

- Activity-based costing (ABC), activity management, and cost system design.
- Factors that affect the adoption of costing systems.
- The influence of costing systems on business units' non-financial and financial performance.

I recognize how busy you must be and would greatly appreciate you taking a few minutes of your time to complete this pilot questionnaire. If by chance you did not receive the pilot questionnaire, or it got misplaced, I have enclosed a replacement. I would be grateful if you would please complete the pilot research questionnaire and questionnaire consent form, and return them to me as soon as possible in the enclosed stamped-addressed envelope. Your answers are confidential. The number in the top right-hand corner of the questionnaire is used to determine who has returned it.

If you have any questions or concerns about the pilot research questionnaire, please feel free to e-mail me at hmalshamlan1@sheffield.ac.uk

Thank you for your help and cooperation.

Yours faithfully,

Hanadi Alshamlan
PhD researcher
Sheffield University Management School

Appendices 3: The questionnaire and letters accompanying the main study

Appendix 3.1: The final questionnaire (Adapted from Alshamlan, 2018)

A1

£

The Determinants of Costing Systems, and Costing Systems' Impact on Performance

This survey aims to obtain information that will be used to determine the factors that influence the adoption of activity-based costing systems, activity management usage and cost system sophistication and the effect of these costing systems on non-financial and financial performance. The responses you give are confidential. The number in the top right-hand corner is used to identify who has returned the questionnaire.

You should answer the questionnaire from the perspective of business unit that most clearly defines where you work (e.g. a head office of divisionalised company, a division of a divisionalised company, a non-divisionalised company, an autonomous company, etc.). If you do not have a costing system to calculate the costs of your various services, please go to question C1 in the questionnaire.

When you have completed the questionnaire please return it to me in the enclosed stamped addressed envelope.

Thank you for your help and cooperation.

Sheffield University Management School
The University of Sheffield
Conduit Road
Sheffield
S10 1FL

Section A: The Costing System in Your Business Unit

The following information relates to questions A1, A2 and A3

Activity-based costing (ABC) assigns overhead costs to services through the following steps: (1) Identify the main activities and record overhead costs associated with each of these activities. (2) Identify the most relevant factor (i.e. cost driver) for each activity which causes the overhead costs recorded for that activity to be incurred. The cost driver is used to assign each activity's overhead costs to the services that are offered to customers.

(A1) Using the definition above, which of the following describes your business unit's experience with activity-based costing (ABC)? (Please circle the appropriate number.)

1. Have adopted ABC (please go to question A2).
2. Intending to adopt ABC (please go to question A3).
3. Currently investigating whether to adopt ABC (please go to question A3).
4. Intending to investigate whether to adopt ABC in the near future (please go to question A3).
5. Adopted ABC and decided subsequently to abandon it (please go to question A3).
6. Investigated whether to adopt ABC and decided to reject it (please go to question A3).
7. Have considered whether to adopt ABC, but did not investigate it and decided to reject it (please go to question A3).
8. Never considered whether to adopt ABC (please go to question A3).
9. Other (please specify) ____.

(A2) How long is it since your business unit adopted ABC?

Please write the number of years here (to the nearest year): ______________________years.

(A3) Please indicate the extent to which the following statements describe current practices in your business unit's costing system? (Please circle the appropriate number.)

	Not at all	Small extent	Medium extent	Large extent	Very large extent
a. Our business unit identifies and analyses the various activities involved in providing services, but without recording their associated costs.	1	2	3	4	5
b. Our business unit identifies, analyses and records the costs of the various activities involved with providing services, but it does not then use this cost information to calculate the cost of each services provided.	1	2	3	4	5
c. Our business unit identifies, analyses and records the costs of the various activities involved with providing services, and then uses this cost information to calculate the cost of each service provided.	1	2	3	4	5

(A4) Please indicate the uses of the costing system in your business unit. (Please circle all that apply.)

1. To allocate costs for internal and external profit measurement.
2. To provide information to assist with decision making.
3. To provide information for planning, control and performance measurement.
4. To prepare ad hoc and detailed special studies relating to decisions like outsourcing, redesigning or reducing the cost of a service.

The following information relates to questions A5 and A6

The typical procedure for assigning overhead costs to cost objects involves a two-stage process:

In the **first** stage, overheads are allocated to cost pools (or cost centres).

(A cost pool/centre represents a location, where a single or group of overhead costs are initially accumulated to later assign the overhead costs to cost objects, such as services provided.)

(A5) How many cost pools (or cost centres) are used in the costing system in your business unit?

Please write the number here: ______________________________cost pools (or cost centres).

In the **second** stage, the overhead allocation rate (or cost driver) for each cost pool (or cost centre) is identified and used to assign overhead costs to services.

(An overhead allocation rate (or cost driver) assigns the overhead costs from cost pools to the services. A cost driver also measures how a service's resources are consumed.)

(A6) How many second stage overhead allocation rates (or cost drivers) are used to assign overhead costs accumulated in cost pools (or cost centres) to services? (If you do not have any second stage allocation rates (or cost drivers), then you should report zero.)

Please write the number here: _________________ overhead allocation rates (or cost drivers).

The following information relates to question A7

Volume overhead allocation rates (or volume cost drivers) (e.g. labour costs and labour hours) assume that overhead costs are consumed each time a service is performed. On the other hand, **non-volume overhead allocation rates** (or non-volume cost drivers) (e.g. number of service design changes and hours devoted to service quality control) are not necessarily performed each time a unit of a service is performed.

(A7) Given the explanation above, can you divide the total number of second-stage overhead allocation rates (or cost drivers) you reported in question (A6) into volume and non-volume overhead allocation rates (or cost drivers).

Please write the number here: ________volume overhead allocation rates (or cost drivers).

Please write the number here: _______non-volume overhead allocation rates (or cost drivers).

Section B: Your Business Unit's Environment

If you are not familiar with the subject of the questions below, please consult with another member of staff in your business unit.

(B1) What level of competition does your business unit face in each of the following areas? (Please circle the appropriate number.)

	None or not at all	Small level	Medium level	High level	Very high level
a. The intensity of competition for the major services provided.	1	2	3	4	5
b. Our suppliers have the ability to negotiate higher prices with our business unit.	1	2	3	4	5
c. Our customers have the ability to negotiate lower prices with our business unit.	1	2	3	4	5
d. The degree to which our business unit is threatened by substitute services.	1	2	3	4	5

(B2) To what extent does your business unit emphasise each of the following strategies? (Please circle the appropriate number.)

	Not at all	Small extent	Medium extent	High extent	Very high extent
a. We seek to maintain brand identification.	1	2	3	4	5
b. We seek to be unique in our industry and find that buyers are willing to pay a premium price for that uniqueness.	1	2	3	4	5
c. We invest in technology to develop unique service designs.	1	2	3	4	5
d. We seek to be the lowest cost service provider in our industry.	1	2	3	4	5
e. We place considerable emphasis on reaping cost advantages from all services.	1	2	3	4	5
f. We invest in technology to develop low-cost service designs.	1	2	3	4	5

(B3) What level of service diversity has your business unit provided for each of the following areas? (Please circle the appropriate number.)

	Not at all	Small level	Medium level	High level	Very high level
a. Our business unit requires different processes to design services.	1	2	3	4	5
b. Our business unit requires different processes to provide services.	1	2	3	4	5
c. Our business unit has differences in the volume of services provided across different services.	1	2	3	4	5
d. Our business unit has differences in the volumes of services provided across different service segments.	1	2	3	4	5

(B4) Please indicate your level of agreement about the reduction in service cycle time in your business unit? (Please circle the appropriate number.)

	Not at all	Small level	Medium level	High level	Very high level
a. We simplify the work methods to reduce the time associated with value-added activities.	1	2	3	4	5
b. We simplify the work methods to reduce the time associated with non-value-added activities.	1	2	3	4	5
c. We invest in new technology to reduce the time associated with value-added activities.	1	2	3	4	5
d. We invest in new technology to reduce the time associated with non-value-added activities.	1	2	3	4	5

(B5) Please indicate your level of agreement about the level of service quality in your business unit? (Please circle the appropriate number.)

	Not at all	Small level	Medium level	High level	Very high level
a. Our business unit has the required skills and knowledge to perform services.	1	2	3	4	5
b. Our business unit performs services properly first time and honours its promises.	1	2	3	4	5
c. Our business unit aims to keep our customers informed about when services will be performed.	1	2	3	4	5
d. Our business unit provides easily accessible services.	1	2	3	4	5
e. Our business unit has convenient locations for service facilities.	1	2	3	4	5
f. Our business has convenient operating hours.	1	2	3	4	5
g. Our business unit's customers feel safe with their transactions with our business unit.	1	2	3	4	5
h. Our business unit readily responds to customers' requests.	1	2	3	4	5

(B6) To what extent has your business unit experienced a reduction in the following costs? (Please circle the appropriate number.)

	No reduction	Small reduction	Medium reduction	High reduction	Very high reduction
a. Direct service costs.	1	2	3	4	5
b. Indirect service costs.	1	2	3	4	5

(B7) To what extent has your business unit experienced an improvement in its financial performance using the following performance measures? (Please circle the appropriate number.)

	No improvement	Small improvement	Medium improvement	Large improvement	Very large improvement
a. Net sales (operating revenue earned by our business unit for rendering our services).	1	2	3	4	5
b. Return on investment (net profit from investments divided by the cost of the investment).	1	2	3	4	5
c. Return on assets (net profit divided by total assets).	1	2	3	4	5

Section C: Demographics and Firm Characteristics

(C1) For your business unit, please provide an approximate percentage breakdown of your cost structure by entering the percentages in the appropriate spaces below:

a. Direct costs that can be traced directly to services.	%
b. Indirect service-based costs that cannot be traced directly to services.	%
c. Non-service-based costs (e.g. administration costs) that cannot be traced directly to services.	%
Total costs.	100 %

(C2) a. What is the approximate number of employees and accountants in your business unit?

Please write the number here: _______________ employees, ________________ accountants.

b. What was the approximate annual sales revenue of your business unit in the last financial year?

Please write the amount here: ____ pounds.

c. What was the approximate capital employed (net assets) of your business unit in the last financial year?

Please write the amount here: ____ pounds.

(C3) Please briefly describe the service sector of your business?

____.

Is there anything else you would like to say about the costing of services in your business unit? (If so, please use the space below and/or a separate sheet of paper.)

Would you like to receive a summary of the research results? (If yes, please provide your name, e-mail address and telephone number below.) Yes No

As part of this research, would you be willing to answer questions about your costing system in a face-to-face interview? (If yes, please provide your name, e-mail address and telephone number below.)

Yes No

Your Name: ____.

E-mail address: ____.

Telephone Number: ____.

Your contribution of this research effort is greatly appreciated.

Appendix 3.2: A letter sent to respondents who requested a copy of the questionnaire results

Potential respondent's address

11 January 2021

Dear Sir/Madam,

Thank you for completing my PhD survey questionnaire, titled "The Determinants of Costing Systems, and Costing Systems' Impact on Performance", which was sent to you in September 2018. The survey questionnaire was concerned with costing systems in the UK non-manufacturing companies and included questions about:

- Activity-based costing (ABC) adoption, activity management usage, and cost system sophistication.
- The factors that affect the adoption of these costing systems.
- The influence of costing systems on business units' non-financial and financial performance.

As you requested a summary of the survey results, please find the document attached. I would like to thank you for taking part in the survey and please do not hesitate to e-mail me at hmalshamlan1@sheffield.ac.uk if you have any queries about the research results.

Yours sincerely,

Hanadi Alshamlan
PhD researcher
Sheffield University Management School

Appendix 3.3: Summary of questionnaire results to the respondents who requested a copy of the questionnaire results

The Determinants of Costing Systems, and Costing Systems' Impact on Performance: A Summary of the Questionnaire Results

By: Hanadi Alshamlan
PhD researcher
Sheffield University Management School

Background

A survey questionnaire was completed from September to December 2018 by 204 management accountants working in UK non-manufacturing companies. The aim of the survey was to examine the influence of a number of explanatory factors on (1) activity-based costing (ABC) adoption, (2) activity management usage and (3) cost system sophistication.

ABC adoption assigns overhead costs to services through: (1) Identifying the main activities and recording overhead costs associated with each of those activities. (2) Identifying the most relevant factor (i.e. cost driver) for each activity which causes the overhead costs for that activity to be incurred. The cost driver is used to assign each activity's overhead costs to the services that are offered to customers.

Activity management relates to the way that ABC is practised and its usage has been described as having three different levels of intensity: (1) activity analysis usage, (2) activity-cost analysis usage and (3) ABC usage. Activity analysis concentrates on identifying and analysing various activities involved in providing services, but without recording associated costs. Activity-cost analysis concentrates on identifying, analysing and recording the costs of various activities involved with providing services, but it does not use this cost information to calculate the cost of each service provided. ABC usage concentrates on identifying, analysing and recording the costs of various activities involved with providing services, and then using this cost information to calculate the cost of each service provided.

Cost system sophistication takes a much broader approach to analysing cost systems so that cost systems can range from a simple costing system to a highly sophisticated costing system, which can be measured by the number of cost pools, number of volume cost drivers and number of non-volume cost drivers.

One objective of this research is to find which explanatory factors influence costing systems. The factors examined are a differentiation strategy, a cost leadership strategy, the level of competition, the level of service diversity, the level of overheads in the cost structure and the size of the business unit.

Another objective of this research is to examine the extent to which costing systems influence non-financial performance factors (when defined as the improvement of service quality, service cycle time reduction, and cost reduction) and whether this affects business unit financial performance. Figure 1 depicts the research model that was developed and tested, and shows the sign of the proposed relationship between the various constructs. The following sections report the research findings.

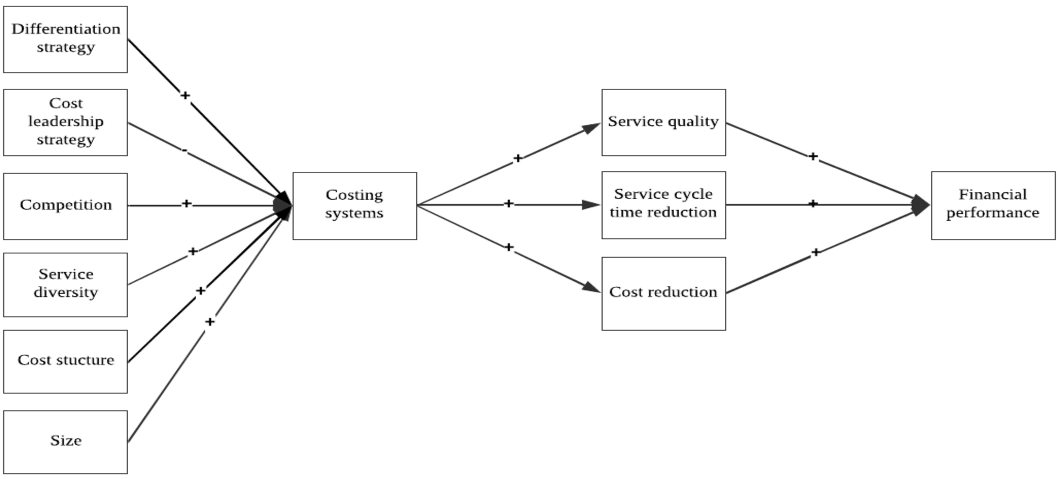
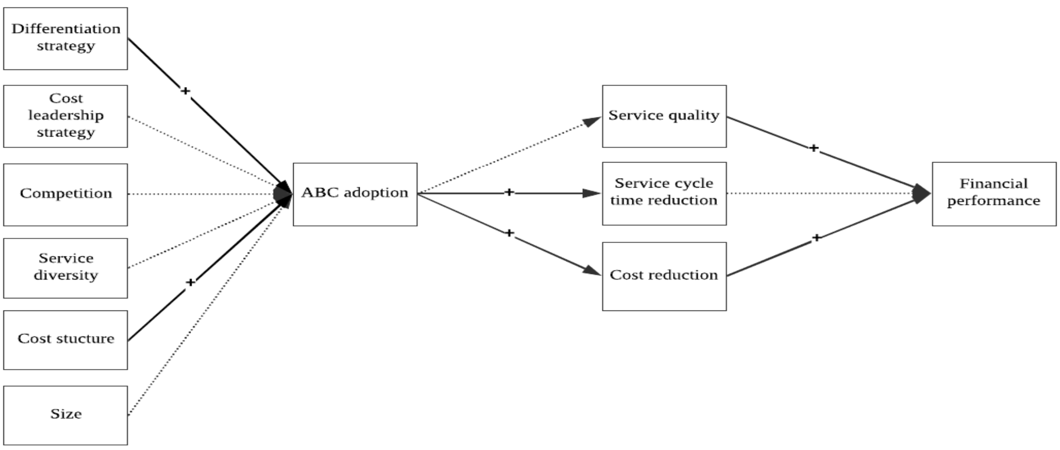


Figure 0: The research model.

Research findings relating to ABC adoption

Figure 2 depicts the results of the research model for ABC adoption. The research found that having a differentiation strategy and having a higher level of overheads in the cost structure each influence ABC adoption, and ABC adoption influences the level of cost reduction, which in turn affects financial performance.

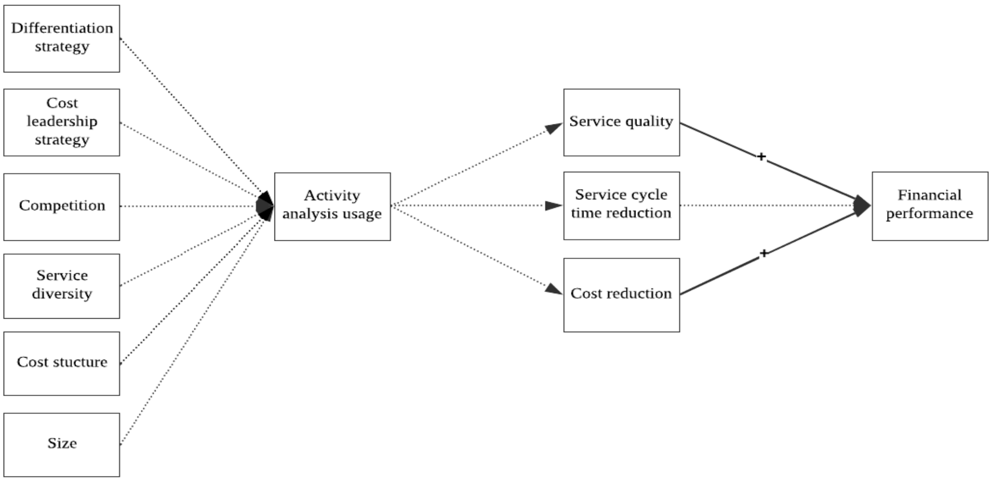


The solid line indicates that a significant relationship has been found.
The dotted line indicates that no relationship has been found.

Figure 2: Results of the research model for ABC adoption.

Research findings relating to activity analysis usage

Figure 3 depicts the results of the research model for activity analysis usage. The research found that none of the explanatory factors influence activity analysis usage, and activity analysis usage does not influence non-financial and financial performance.

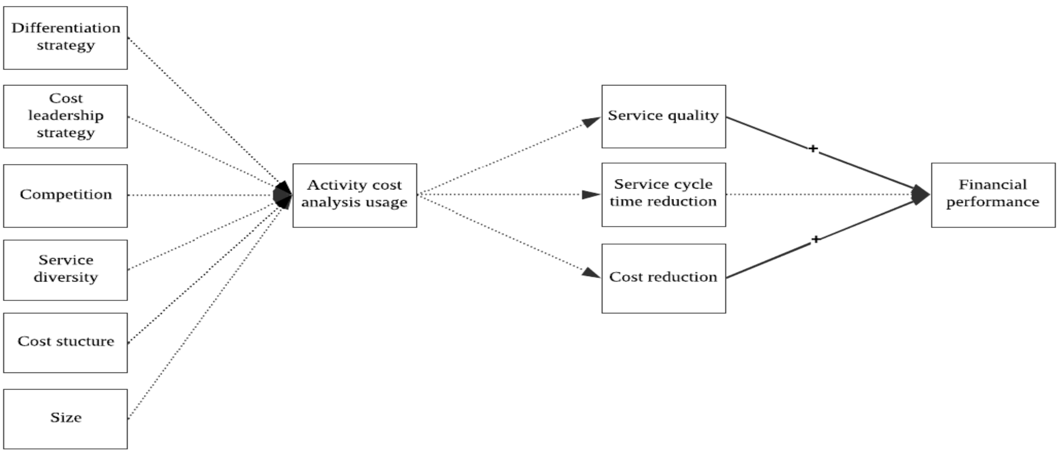


The solid line indicates that a significant relationship has been found.
The dotted line indicates that no relationship has been found.

Figure 3: Results of the research model for activity analysis usage.

Research findings relating to activity-cost analysis usage

Figure 4 depicts the results of the research model for activity-cost analysis usage. The research found that none of the explanatory factors influence activity-cost analysis usage, and activity-cost analysis usage does not influence non-financial and financial performance.



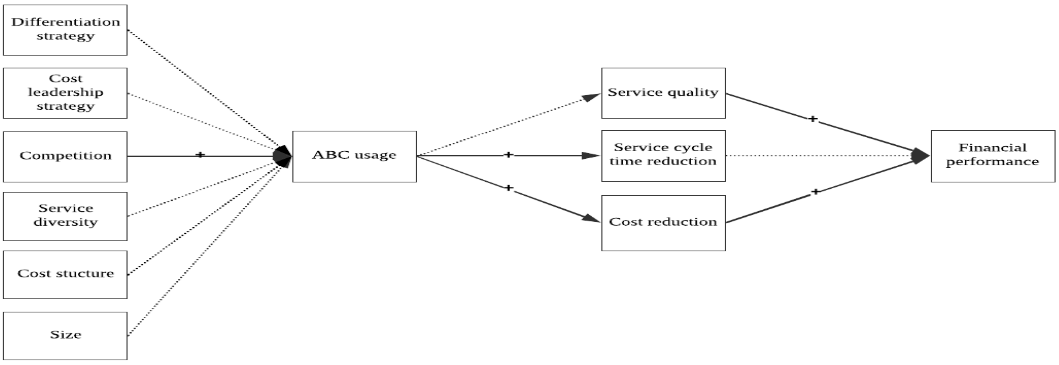
The solid line indicates a that a significant relationship has been found.
The dotted line indicates that no relationship has been found.

Figure 4: Results of the research model for activity-cost analysis usage.

Research findings relating to ABC usage

Figure 5 depicts the results of the research model for ABC usage. The research found that companies facing a higher the level of competition were more likely to use ABC, and the more

ABC is used increases the use of cost reduction methods, which in turn increases financial performance.

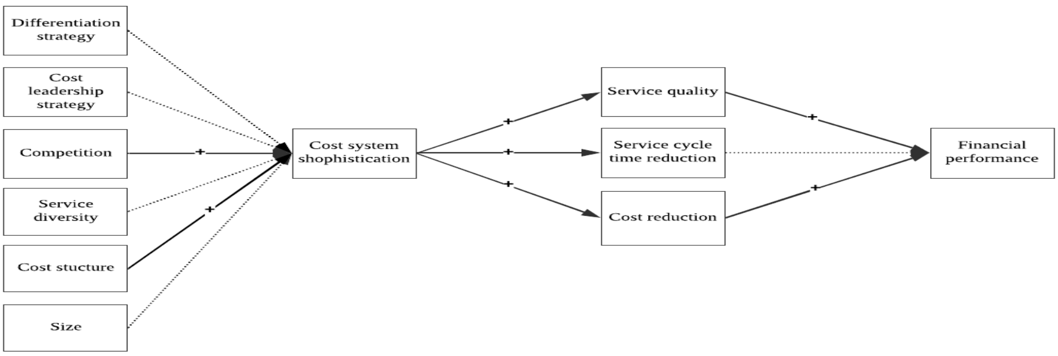


The solid line indicates that a significant relationship has been found.
The dotted line indicates that no relationship has been found.

Figure 5: Results of the research model for ABC usage.

Research findings relating to cost system sophistication

Figure 6 depicts the results of the research model for cost system sophistiaction. The research found that the higher the level of competition and higher the level of overheads in the cost structure, then the higher is the cost system sophistication, and cost system sophistication influences the improvement of service quality and cost reduction, which, each, affect financial performance.



The solid line indicates a that significant relationship has been found.
The dotted line indicates that no relationship has been found.

Figure 6: Results of the research model for cost system sophistication.

Summary

The results of the research reveal some differences between ABC adoption, activity management usage and cost system sophistication. Specifically, the use of activity analysis and activity-cost analysis do not affect financial performance, which may lead to questions regarding their use. In contrast, but in specific circumstances, the adoption of ABC, its usage and cost system sophistication do have an indirect effect on the financial performance of non-manufacturing firms.

Appendix 3.4: Consent form for the final questionnaire

The Determinants of Costing Systems, and Costing Systems' Impact on Performance

Please tick the appropriate boxes	**Yes**	**No**
Taking Part in the Project		
I have read and understood the project information sheet dated 00/00/2018 and the project has been fully explained to me. (If you will answer No to this question please do not proceed with this consent form until you are fully aware of what your participation in the project will mean.)	☐	☐
I have been given the opportunity to ask questions about the project.	☐	☐
I agree to take part in the project. I understand that taking part in the project will include completing a questionnaire.	☐	☐
I understand that my taking part is voluntary and that I can withdraw from the study at any time; I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw.	☐	☐
How my information will be used during and after the project		
I understand my personal details such as name, phone number, address and email address etc. will not be revealed to people outside the project.	☐	☐
I understand and agree that my words may be quoted in publications, reports, web pages, and other research outputs. I understand that I will not be named in these outputs unless I specifically request this.	☐	☐
I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐
I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐
I give permission for the questionnaire answer that I provide to be deposited in Microsoft Excel sheets so it can be used for future research and learning	☐	☐
So that the information you provide can be used legally by the researchers		
I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield.	☐	☐

Name of participant	Signature	Date
Hanadi Alshamlan		00/00/2018
Name of Researcher	Signature	Date

Project contact details for further information:
Researcher: Hanadi Alshamlan
PhD Researcher at Sheffield University Management School
E-mail: hmalshamlan1@sheffield.ac.uk
Mobile No:

If you are unhappy about any aspect of the research process, please contact the research supervisor, Dr John Brierley, and feel free to e-mail him at j.a.brierley@sheffield.ac.uk or the head of Accounting and Financial Management Division, Professor Jim Haslam, and feel free to e-mail him at j.haslam@sheffield.ac.uk

Appendix 3.5: Participant information sheet for the main questionnaire

1. Research Project Title:

The Determinants of Costing Systems, and Costing Systems' Impact on Performance.

2. Invitation paragraph

You are being invited to take part in a research project. Before you decide whether or not to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

3. What is the project's purpose?

This research aims to obtain data to examine which contingent variables are associated with the adoption of activity-based costing, activity management and cost system design, and how these influence financial and non-financial performance in the UK non-manufacturing companies.

4. Why have I been chosen?

You have been selected from the Financial Analysis Made Easy (FAME) database to take part of a research questionnaire that looks at the type of cost systems used by UK non-manufacturing companies. Management accountants are in the best position to complete the questionnaire. They have been used in prior survey cost and management accounting research because they can provide relevant information about the cost accounting system and practice.

5. Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep (and be asked to sign a consent form) and you can still withdraw at any time without any negative consequences. You do not have to give a reason. If you wish to withdraw from the research, please contact the researcher Mrs Hanadi Alshamlan, and feel free to e-mail her at hmalshamlan1@sheffied.ac.uk

6. What will happen to me if I take part? What do I have to do?

If you decide to complete the questionnaire you need to answer a number of questions concerned with costing systems, the variables that can affect their design and measures of non-financial and financial performance. You can either return the completed questionnaire in the post by using the prepaid envelope or request to complete and return an online version of the questionnaire.

7. What are the possible disadvantages and risks of taking part?

The research does not pose any disadvantages or risks for participants who complete the questionnaire.

What are the possible benefits of taking part?

Whilst there are no immediate benefits for those participating in the project, it is hoped that this work will have a beneficial impact on UK non-manufacturing companies.

8. Will my taking part in this project be kept confidential?

All the information that we collect about you during the course of the research will be kept strictly confidential and will only be accessible to Hanadi Alshamlan. You will not be able to be identified in any reports or publications unless you have given your explicit consent for this. If you agree to us sharing the information you provide with other researchers (e.g. by making it available in a data archive) then your personal details will not be included unless you explicitly request this.

9. What is the legal basis for processing my personal data?

According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

10. What will happen to the data collected, and the results of the research project?

The researcher will code the questionnaire data provided and record it on Microsoft Excel sheets which will be encrypted with a password that will not be known by anyone except the PhD researcher. The questionnaire data will be stored in a locker provided to the PhD researcher by the University of Sheffield. The questionnaire data will be analysed for the purpose of this PhD research project titled "The Determinants of Costing Systems, and costing systems' Impact on Performance" and for publishing academic papers at conferences and in academic journals. You will not be identified in any of these publications. The data will be stored for the duration of these projects and will be destroyed after they have been completed.

Due to the nature of this research, it is very likely that other researchers may find the data collected to be useful in answering future research questions. We will ask for your explicit consent for your data to be shared in this way.

11. Who is organising and funding the research?

This research is funded by Royal Embassy of Saudi Arabia Cultural Bureau in London.

12. Who is the Data Controller?

The University of Sheffield will act as the data controller for this study. This means that the University of Sheffield is responsible for looking after your information and using it properly.

13. Who has ethically reviewed the project?

This project has been ethically approved via the University of Sheffield's Ethics Review Procedure, as administered by Sheffield University Management School.

14. What if something goes wrong and I wish to complain about the research?

If you are unhappy about any aspect of the research process, please contact the research supervisor, Dr John Brierley, j.a.brierley@sheffield.ac.uk. If you feel that any complaint has not been handled satisfactorily, you should contact the Head of Accounting and Financial Management Division, Professor Jim Haslam, at j.haslam@sheffield.ac.uk

15. Contact for further information

If you wish to obtain further information about the research, please feel free to e-mail the researcher Mrs Hanadi Alshamlan at hmalshamlan1@sheffield.ac.uk or contact the research supervisor, Dr John Brierley, at j.a.brierley@sheffield.ac.uk

You will be given a copy of the information sheet and, if appropriate, a signed consent form to keep.

Thank you for taking part in the project.

Appendix 3.6: Cover letter for the final questionnaire

Potential respondent's address

24 September 2018

Dear Sir/Madam,

You have been selected to take part in a survey that concerns the type of cost systems used by UK non-manufacturing companies. Your company has been identified by using the Financial Analysis Made Easy (FAME) database, which consists of information about UK companies, including their location, type of industry and size. The questionnaire is part of my PhD research at the University of Sheffield. A participant information sheet is enclosed that gives information about the survey, there is also a consent form for you to complete and the questionnaire includes questions about:

- Activity-based costing (ABC), activity management and cost system design.
- Factors that affect the adoption of costing systems.
- The influence of costing systems on business units' non-financial and financial performance.

In your opinion the most appropriate person in your business unit should complete this research questionnaire. Please feel free to share this research questionnaire with other knowledgeable persons in your business unit to assist in providing accurate answers. Your answers are confidential. It would be helpful if you can please complete and return the questionnaire and questionnaire consent form to me as soon as possible in the enclosed stamped-addressed envelope. The number in the top right-hand corner of the questionnaire is used to determine who has returned it.

If you have any questions or concerns about the research questionnaire, or would prefer to complete an online version of the questionnaire, then please feel free to e-mail me at hmalshamlan1@sheffield.ac.uk

Thank you for your help and cooperation.

Yours faithfully,

Hanadi Alshamlan
PhD researcher, Sheffield University Management School

Appendix 3.7: First follow-up letter for main questionnaire

Potential respondent's address

15 October 2018

Dear Sir/Madam,

About three weeks ago I sent you a research questionnaire about the cost systems used by UK non-manufacturing companies. The research questionnaire includes questions about:

- Activity-based costing (ABC), activity management and cost system design.
- Factors that affect the adoption of costing systems.
- The influence of costing systems on business units' non-financial and financial performance.

If you have already returned the research questionnaire, then please accept my sincere thanks. If not, I would be grateful if you would please complete the research questionnaire and questionnaire consent form, and return them to me as soon as possible in the enclosed stamped-addressed envelope. In addition, you can find further information about the survey in the enclosed participant information sheet. Your answers are confidential. The number in the top right-hand corner of the questionnaire is used to determine who has returned it.

If you have any questions or concerns about the research questionnaire, or would prefer to complete an online version of the questionnaire then, please feel free to e-mail me at hmalshamlan1@sheffield.ac.uk

Thank you for your help and cooperation.
Yours faithfully,

Hanadi Alshamlan
PhD researcher
Sheffield University Management School

Appendix 3.8: Second follow-up letter for the main questionnaire

Potential respondent's address

05 November 2018

Dear Sir/Madam,

On 24 September 2018 and again on 15 October 2018, I sent your company, at the above address, a questionnaire related to my PhD research project at the University of Sheffield. Unfortunately, I have not received a completed questionnaire. The research questionnaire is about the cost systems used by UK non-manufacturing companies. The research questionnaire includes questions about:

- Activity-based costing (ABC), activity management and cost system design.
- Factors that affect the adoption of costing systems.
- The influence of costing systems on business units' non-financial and financial performance.

I recognise how busy you must be and would greatly appreciate you taking a few minutes of your time to complete this questionnaire. I would be grateful if you would please complete the research questionnaire and questionnaire consent form, and return it to me as soon as possible in the pre-paid return envelope. In addition, you can find further information about the survey in the enclosed participant information sheet. Your answers are confidential. The number in the top right-hand corner of the questionnaire is used to determine who has returned it. If you have any questions or concerns about the research questionnaire, or would prefer to complete an online version of the questionnaire, then please feel free to e-mail me at hmalshamlan1@sheffield.ac.uk

Thank you for your help and cooperation.
Yours faithfully,

Hanadi Alshamlan
PhD researcher, Sheffield University Management School

Appendices 4: The non-response bias tests

Appendix 4.1: Chi-square tests for nominal variable (ABC adoption)

	ABC adoption construct 4[a]		
	Scenario 1[a]	Scenario 2[b]	Scenario 3[c]
	Asymp. Sig. (2-tailes)	Asymp. Sig. (2-tailes)	Asymp. Sig. (2-tailes)
A1-ABC	0.42	0.90	0.09
a. Cells have expected count less than 5.	0 cells (0%)	0 cells (0%)	0 cells (0%)

[a] ABC adoption includes companies that adopted ABC and chose option 1 in question A1; however, for non-adoption, it included all these companies that have not adopted ABC.
[b] First scenario compares questionnaires received prior the first reminder (n = 38), with questionnaires received after the second reminder (n = 92).
[c] Second scenario compares questionnaires received prior the first reminder (n = 38), with questionnaires received after the first and second reminder (n = 89+92).
[d] Third scenario compares questionnaires received prior and after the first reminder (n = 38+ 89), with questionnaires received after the second reminder.

Appendix 4.2: Chi-square tests for nominal variables (the use of costing systems)

Variable	Scenario 1[a]	Scenario 2[b]	Scenario 3[c]
	Asymp. Sig. (2-tailes)	Asymp. Sig. (2-tailes)	Asymp. Sig. (2-tailes)
A4- Use of costing system	0 .62	0.75	0.15
a. Cells have expected count less than 5.	42 cells (87.5%)	46 cells (85.2)	44 cells (81.5%)

[a] First scenario compares questionnaires received prior the first reminder (n = 38), with questionnaires received after the second reminder (n = 92).
[b] Second scenario compares questionnaires received prior the first reminder (n = 38), with questionnaires received after the first and second reminder (n = 89+92).
[c] Third scenario compares questionnaires received prior and after the first reminder (n = 38+ 89), with questionnaires received after the second reminder.

Appendix 4.3: Independent T test and Mann-Whitney Test for interval variables

Variables	Independent T test			Mann-Whitney test		
	Scenario 1[a]	Scenario 2[b]	Scenario 3[c]	Scenario 1[a]	Scenario 2[b]	Scenario 3[c]
	Asymp. Sig. (2-tailes)	Asymp. Sig. (2-tailes)	Asymp. Sig. (2-tailes)	Asymp. Sig. (2-tailes)	Asymp. Sig. (2-tailes)	Asymp. Sig. (2-tailes)
AA usage	0.01	0.03	0.03	0.01	0.02	0.05
ACA usage	0.36	0.60	0.17	0.37	0.58	0.20
ABC usage	0.44	0.73	0.01	0.86	0.44	0.02
Competition	0.77	0.88	0.67	0.88	0.98	0.68
Differentiation strategy	0.76	0.88	0.66	0.79	0.92	0.64
Cost leadership strategy	0.66	0.89	0.41	0.68	0.97	0.37
Service diversity	0.78	0.79	0.87	0.67	0.74	0.73
Service cycle time reduction	0.60	0.42	0.71	0.58	0.44	0.81
Service quality	0.13	0.24	0.16	0.13	0.23	0.14
Cost reduction	0.05	0.02	0.88	0.03	0.01	0.88
Financial performance	0.36	0.28	0.88	0.43	0.32	0.98
Cost pools	0.05	0.84	0.04	0.27	0.75	0.03
Cost drivers	0.37	0.21	0.72	0.96	0.54	0.19
Volume cost drivers	0.71	0.35	0.27	0.96	0.49	0.21
Non-volume cost drivers	0.23	0.16	0.69	0.65	0.82	0.17
Cost structure	0.01	0.00	0.58	0.01	0.01	0.36
Number of employees	0.87	0.40	0.29	0.63	0.81	0.11
Sales revenue	0.74	0.29	0.31	0.00	0.01	0.00
Capital employed	0.11	0.02	0.73	0.05	0.65	0.00

[a] First scenario compares questionnaires received prior the first reminder (n = 38), with questionnaires received after the second reminder (n = 92).
[b] Second scenario compares questionnaires received prior the first reminder (n = 38), with questionnaires received after the first and second reminder (n = 89+92).
[c] Third scenario compares questionnaires received prior and after the first reminder (n = 38+ 89), with questionnaires received after the second reminder.

Appendices 5: The interview schedules and letters

Appendix 5.1: The interview schedules

Introduction

1. Introduce myself:

My name is Hanadi Alshamlan. I am a PhD student at the University of Sheffield and the research is sponsored by Imam Muhammad Ibn Saud Islamic University, Saudi Arabia.

2. Information about my PhD research:

This research focuses on the factors that impact on cost systems in UK non-manufacturing companies and the influence of cost systems on non-financial and financial performance.

3. Information about the interview:
   - 3.1 I would like to ask you questions about the results of analysing the questionnaire responses and your responses to the questionnaire.
   - 3.2 All information that you provide is confidential and will not be shown to any third party.
   - 3.3 Your business unit and your name will not be shown in my PhD thesis or in any research papers that may be published subsequently from my PhD.
   - 3.4 The interview will take between 60 to 90 minutes.
   - 3.5 You can withdraw from the interview at any time.
   - 3.6 I sent you the participant information sheet by email on 00/00/2019. Are you happy to take part in the research interview? If so, then can you please sign two copies of the consent form? One form is for you and one is for me.
   - 3.7 Do you mind if I record this interview? This will help me to review the interview comments and it will reduce the interview time because I will not need to make notes during the interview.

Section 1: Activity-based costing adoption model.

Can you please look at figure 1 (ABC adoption model where ABC adoption measured by adopted or not adopted)?

The results in the left section of ABC adoption model relate to the potential factors influencing ABC adoption. These factors are the: (1) adoption of a differentiation strategy. Organisations that use differentiation strategytend to distinguish their services and products from their main competitors in other ways. A differentiation strategy can provide unique services, further developing a company's brand image, dealer network, and customer service levels (Porter, 1980). (2) adoption of a cost leadership strategy. Organisations that use cost leadership strategies tend to provide products at lower prices than their competitors; in addition, companies that follow this type of strategy tend to have high-volume production (Porter, 1980). (3) level of competition, (4) level of service diversity, (5) cost structure where it is measured by the percentage of indirect/overhead costs to direct and indirect/overhead costs, and (6) business unit size where it is measured by the number of employees and sales revenue.

The results of the right section of ABC adoption model relate to the influence of ABC adoption on non-financial and financial performance. ABC adoption can also influence non-financial performance, which in turn can influence financial performance. The non-financial performance factors are: (1) service quality, (2) service cycle time reduction, and (3) cost reduction. The financial performance was measured by net sales, return on investment, and return on assets.

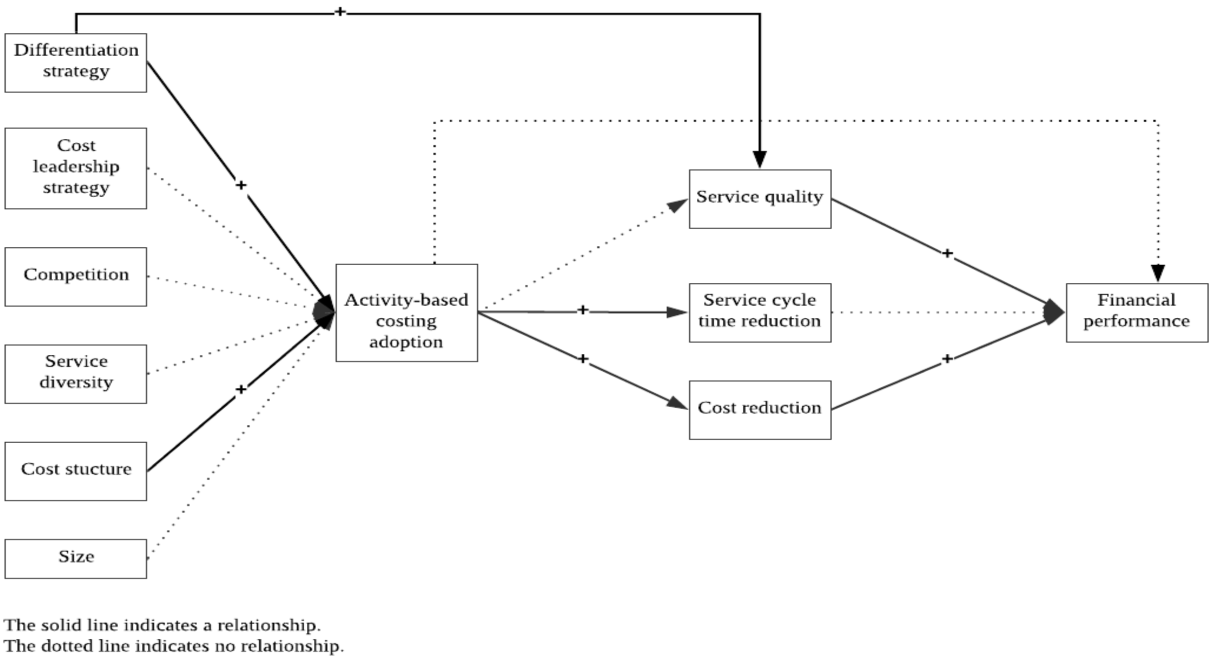


Figure 1: The results of quantitative data (ABC adoption model)

Part 1: The results of the left section of the ABC adoption model, which relate to the potential factors influencing ABC adoption

Differentiation strategy
1. Why do you think there is a positive effect of differentiation strategy on ABC adoption?
2. Why do you think there is a positive effect of differentiation strategy on service quality?

Cost leadership strategy
1. Why do you think there is no effect of cost leadership strategy on ABC adoption?

Competition
1. Why do you think there is no effect of competition on ABC adoption?

Service diversity
1. Why do you think there is no effect of service diversity on ABC adoption?

Cost structure
1. Why do you think there is a positive effect of the percentage of indirect costs to direct and indirect costs on ABC adoption?

Size
1. Why do you think there is a no effect of the size of business unit on ABC adoption?

Part 2: The results of the right section of ABC adoption model, which relate to the influence of ABC adoption on non-financial and financial performance

Service quality
1. Why do you think there is no effect of ABC adoption on service quality?

Service cycle time reduction
1. Why do you think there is positive effect of ABC adoption on the reduction of service cycle time?

Cost reduction
1. Why do you think there is positive effect of ABC adoption on cost reduction?

Financial performance
1. Why do you think there is no effect of ABC adoption on financial performance?
2. Why do you think there is positive effect of service quality on financial performance?
3. Why do you think there is no effect of service cycle time reduction on financial performance?
4. Why do you think there is positive effect of cost reduction on financial performance?

Part 3: Modifications to the left section of the ABC adoption model, and possible factors which can influence it
1. Do you think that any of the independent factors in the ABC adoption model are related to each other? If so, how are they related?

2. What other environmental factors (other than those shown in figure 1) do you think can influence ABC adoption (e.g. the need of control adverse environmental costs)? If so, then the following questions will be asked:
3. Could you please define these factors?
4. Why do you think these factors relate to ABC adoption?
5. How do you think they are related to ABC adoption?

Part 4: Modifications to the right section of the ABC adoption model, and possible performance factors which can ABC adoption may influence

1. Do you think there is any relationship between any of the three non-financial performance factors, service quality, service cycle time reduction and cost reduction in ABC adoption model? If so, how are they related?
2. What other factors (other than those shown in figure 1) do you think ABC adoption may influence? (E.g. cost system satisfaction, cost system quality, quality of decision making and quality of control information.) If so, then the following questions will be asked:
3. Could you please define these factors?
4. Why are they influenced by ABC adoption?
5. Why are they related to financial performance?

Section 2: Activity analyses usage model

Can you please look at figure 2 (activity analysis usage model)?

Activity analysis concentrates on identifying and analysing various activities involved in providing services, but without recording associated costs. This section has the same structure with the previous section.

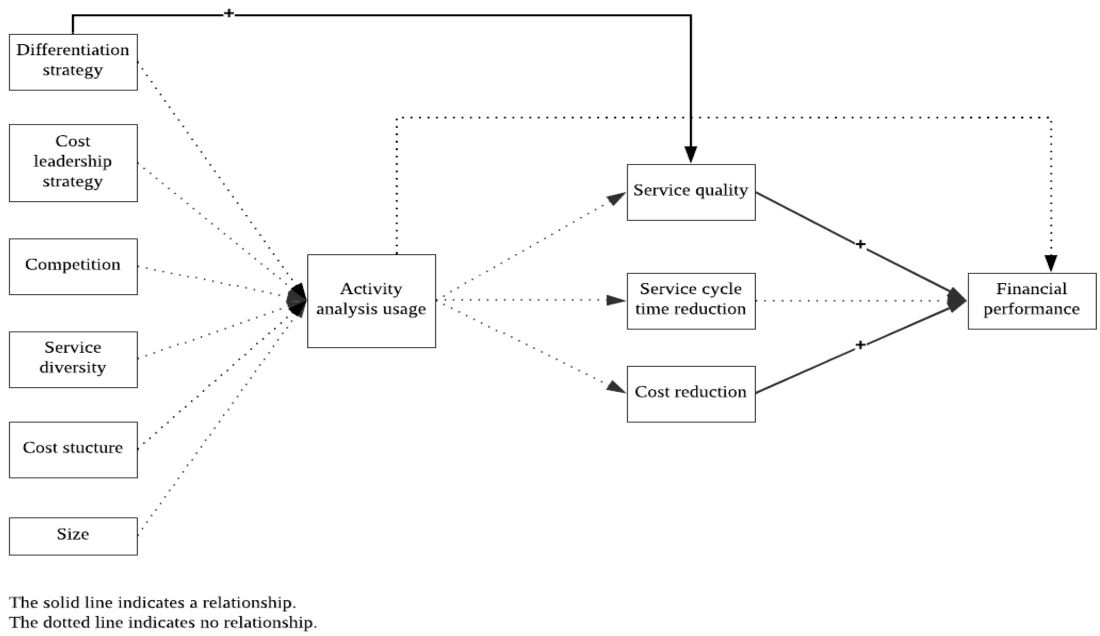


Figure 2: The results of quantitative data (AA model)

Part 1: The results of the left section of activity analysis model, which relate to the potential factors influencing activity analysis

Differentiation strategy
1. Why do you think there is no effect of differentiation strategy on activity analysis usage?
2. Why do you think there is a positive effect of differentiation strategy on service quality?

Cost leadership strategy
1. Why do you think there is no effect of cost leadership strategy on activity analysis usage?

Competition
1. Why do you think there is no effect of competition on activity analysis usage?

Service diversity
1. Why do you think there is no effect of service diversity on activity analysis usage?

Cost structure
1. Why do you think there is no effect of the percentage of indirect costs to direct and indirect costs on activity analysis usage?

Size

1. Why do you think there is a no effect of the size of the business unit on activity analysis usage?

Part 2: The results of the right section of the activity analysis model, which relate to the influence of activity analysis on non-financial and financial performance

Service quality

1. Why do you think there is no effect of activity analysis usage on service quality?

Service cycle time reduction

1. Why do you think there is no effect of activity analysis usage on the reduction of service cycle time?

Cost reduction

1. Why do you think there is no effect of activity analysis usage on cost reduction?

Financial performance

1. Why do you think there is no effect of activity analysis usage on financial performance?

Part 3: Modifications to the left section of the activity analysis model, and possible factors which can influence it

1. What other factors (other than those shown in figure 2) do you think can influence activity analysis usage? If so, then the following questions will be asked:
2. Could you please define these factors?
3. Why do you think these factors relate to activity analysis usage model?
4. How do you think they are related to activity analysis?

Part 4: Modifications to the right section of the activity analysis model, and possible performance factors which activity analysis may influence

1. Do you think there is any relationship between any of the three non-financial performance factors, service quality, service cycle time reduction and cost reduction in the activity analysis usage model? If so, how are they related?
2. What other factors (other than those shown in figure 2) do you think activity analysis usage may influence? (E.g. cost system satisfaction, cost system quality, quality of decision making and quality of control information.) If so, then the following questions will be asked:
3. Could you please define these factors?
4. Why are they influenced by activity analysis?
5. Why are they related to financial performance?

Section 3: Activity-cost analysis usage model

Can you please look at figure 3 (activity-cost analysis usage model)?

Activity-cost analysis concentrates on identifying, analysing and recording the costs of various activities involved with providing services, but it does not then use this cost information to calculate the cost of each service provided. This section has the same structure with the previous sections.

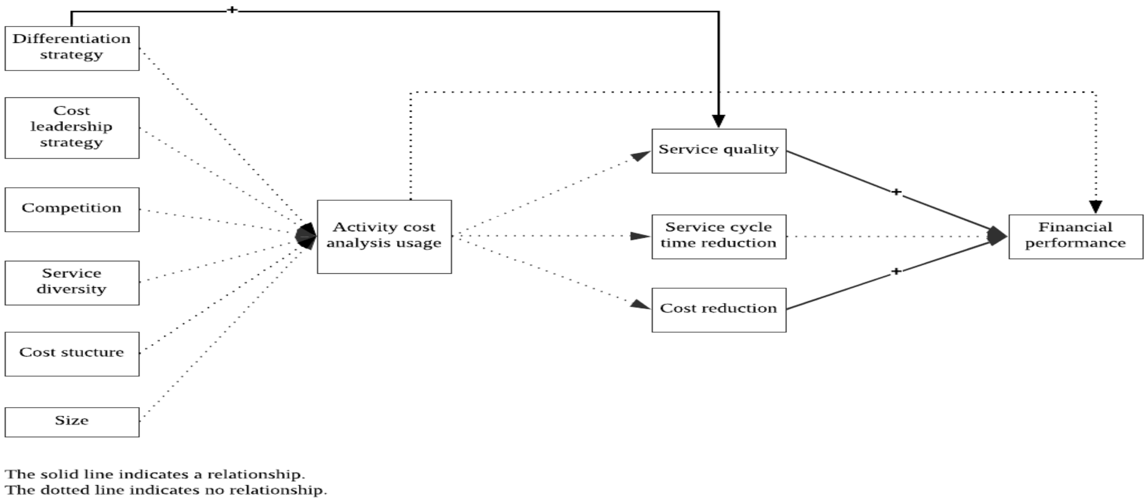


Figure 3: The results of quantitative data (ACA model)

Part 1: The results of the left section of activity-cost analysis model, which relate to the potential factors influencing activity-cost analysis

Differentiation strategy

1. Why do you think there is no effect of differentiation strategy on activity-cost analysis usage?
2. Why do you think there is a positive effect of differentiation strategy on service quality?

Cost leadership strategy

1. Why do you think there is no effect of cost leadership strategy on activity cost-analysis usage?

Competition

1. Why do you think there is no effect of competition on activity cost-analysis usage?

Service diversity

1. Why do you think there is no effect of service diversity on activity cost-analysis usage?

Cost structure

1. Why do you think there is no effect of the percentage of indirect costs to direct and indirect cost on activity-cost analysis usage?

Size

1. Why do you think there is a no effect of the size of business unit on activity-cost analysis usage?

Part 2: The results of the right section of the activity-cost analysis model, which relate to the influence of activity-cost analysis on non-financial and financial performance

Service quality

1. Why do you think there is no effect of activity-cost analysis usage on service quality?

Service cycle time reduction

1. Why do you think there is no effect of activity-cost analysis usage on the reduction of service cycle time?

Cost reduction

1. Why do you think there is no effect of activity-cost analysis usage on cost reduction?

Financial performance

1. Why do you think there is no effect of activity-cost analysis usage on financial performance?

Part 3: Modifications to the left section of the activity-cost analysis model, and possible factors which can influence it

1. What other environment factors (other than those shown in figure 3) do you think can influence activity-cost analysis usage? If so, then the following questions will be asked:
2. Could you please define these factors?
3. Why do you think these factors relate to activity-cost analysis usage model?
4. How do you think they are related to activity-cost analysis?

Part 4: Modifications to the right section of the activity-cost analysis model, and possible performance factors which activity-cost analysis may influence

1. Do you think there is any relationship between any of the three non-financial performance factors, service quality, service cycle time reduction and cost reduction in the activity-cost analysis usage model? If so, how are they related?
2. What other factors (other than those shown in figure 3) do you think activity-cost analysis usage may influence? (E.g. cost system satisfaction, cost system quality, quality of decision making and quality of control information.) If so, then the following questions will be asked:
3. Could you please define these factors?
4. Why are they related to activity-cost analysis usage?
5. Why are they related to financial performance?

Section 4: Activity-based costing usage model

Can you please look at figure 4 (activity-based costing usage model)?
ABC usage concentrates on identifying, analysing and recording the costs of various activities involved with providing services, and then using this cost information to calculate the cost of each service provided. This section has the same structure with the previous section.

Part 1: The results of the left section of ABC usage model, which relate to the potential factors influencing ABC usage

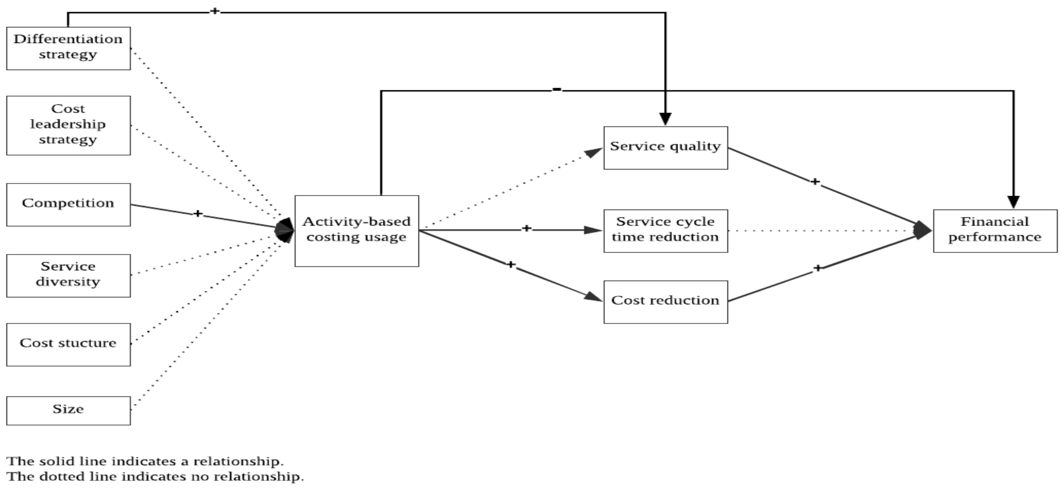


Figure 4: The results of quantitative data (ABC model)

Differentiation strategy
1. Why do you think there is no effect of differentiation strategy on ABC usage?
2. Why do you think there is a positive effect of differentiation strategy on service quality?

Cost leadership strategy
1. Why do you think there is no effect of cost leadership strategy on ABC usage?

Competition
1. Why do you think there is a positive effect of competition on ABC usage?

Service diversity
1. Why do you think there is no effect of service diversity on ABC usage?

Cost structure
1. Why do you think there is no effect of the percentage of indirect costs to direct and indirect costs on ABC usage?

Size
1. Why do you think there is a no effect of the size of business unit on ABC usage?

Part 2: The results of the right section of the ABC usage model, which relate to the influence of ABC usage on non-financial and financial performance

<u>Service quality</u>
1. Why do you think there is no effect of ABC usage on service quality?

<u>Service cycle time reduction</u>
1. Why do you think there is a positive effect of ABC usage on the reduction of service cycle time?

<u>Cost reduction</u>
1. Why do you think there is a positive effect of ABC usage on cost reduction?

<u>Financial performance</u>
1. Why do you think there is negative effect of ABC usage on financial performance?
2. How could ABC usage lead to non-financial performance improvement in terms of cycle time reduction and cost reduction but it leads to decline in financial performance (e.g. net sales, return on investment, and return on assets)?

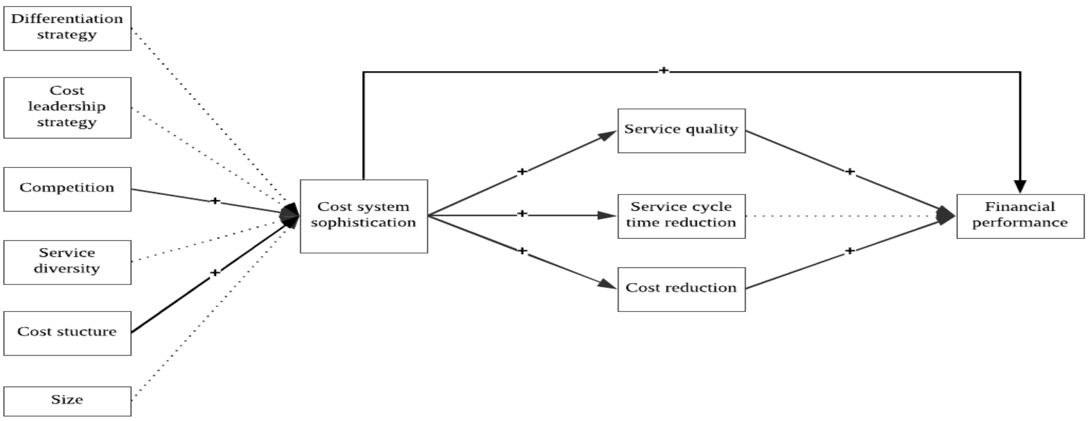
Part 3: Modifications to the left section of the ABC usage model, and possible factors which can influence it
1. What other environment factors (other than those shown in figure 4) do you think can influence ABC usage? If so, then the following questions will be asked:
2. Could you please define these factors?
3. Why do you think these factors relate to ABC usage model?
4. How do you think they are related to ABC usage?

Part 4: Modifications to the right section of the ABC usage model, and possible performance factors which ABC usage may influence
1. Do you think there is any relationship between any of the three non-financial performance factors, service quality, service cycle time reduction and cost reduction in ABC usage model? If so, how are they related?
2. What other factors (other than those shown in figure 4) do you think ABC usage may influence? (E.g. cost system satisfaction, cost system quality, quality of decision making and quality of control information.) If so, then the following questions will be asked:
3. Could you please define these factors?
4. Why are they influenced by ABC usage?
5. Why are they related to financial performance?

Section 5: Cost system sophistication model

Can you please look at figure 5 (cost system sophistication model)?

Cost system sophistication takes a much broader approach to analysing cost systems so that cost systems can range from a simple costing system to a highly sophisticated costing system where it is measured by the number of cost pools, number of volume cost drivers, and number of non-volume cost drivers. This section has the same structure with the previous sections.



The solid line indicates a relationship.
The dotted line indicates no relationship.

Figure 5: The results of quantitative data (CSS model)

Part 1: The results of the left section of cost system sophistication model, which relate to the potential factors influencing cost system sophistication

Differentiation strategy
1. Why do you think there is no effect of differentiation strategy on cost system sophistication?

Cost leadership strategy
1. Why do you think there is no effect of cost leadership strategy on cost system sophistication?

Competition
1. Why do you think there is a positive effect of competition on cost system sophistication?

Service diversity
1. Why do you think there is no effect of service diversity on cost system sophistication?

Cost structure
1. Why do you think there is a positive effect of the percentage of indirect costs to direct and indirect costs on cost system sophistication?

Size
1. Why do you think there is a no effect of the size of the business unit on cost system sophistication?

Part 2: The results of the right section of the cost system sophistication model, which relate to the influence of cost system sophistication on non-financial and financial performance

<u>Service quality</u>
1. Why do you think there is a positive effect of cost system sophistication on service quality?

<u>Service cycle time reduction</u>
1. Why do you think there is a positive effect of cost system sophistication on the reduction of service cycle time?

<u>Cost reduction</u>
1. Why do you think there is a positive effect of cost system sophistication on cost reduction?

<u>Financial performance</u>
1. Why do you think there is a positive effect of cost system sophistication on financial performance?

Part 3: Modifications to the left section of the cost system sophistication model, and possible factors which can influence it
1. What other environment factors (other than those shown in figure 5) do you think can influence cost system sophistication? If so, then the following questions will be asked:
2. Could you please define these factors?
3. Why do you think these factors relate to cost system sophistication?
4. How do you think they are related to cost system sophistication?

Part 4: Modifications to the right section of the cost system sophistication model, and possible performance factors which cost system sophistication may influence
1. Do you think there is any relationship between any of the three non-financial performance factors, service quality, service cycle time reduction and cost reduction in cost system sophistication model? If so, how are they related?
2. What other factors (other than those shown in figure 5) do you think cost system sophistication may influence? (E.g. cost system satisfaction, cost system quality, quality of decision making and quality of control information.) If so, then the following questions will be asked:
3. Could you please define these factors?
4. Why are they influenced by cost system sophistication?
5. How are they related to financial performance?

That concludes the interview. Is there anything you would like to ask me?

Appendix 5.2: The interview consent form

The Determinants of Costing Systems, and Costing Systems' Impact on Performance

Please tick the appropriate boxes	Yes	No
Taking Part in the Project		
I have read and understood the project information sheet dated 1/11/2019 or the project has been fully explained to me. (If you will answer No to this question please do not proceed with this consent form until you are fully aware of what your participation in the project will mean.)	☐	☐
I have been given the opportunity to ask questions about the project.	☐	☐
I agree to take part in the project. I understand that taking part in the project will include being interviewed.	☐	☐
I understand that my taking part is voluntary and that I can withdraw from the study at any time; I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw.	☐	☐
How my information will be used during and after the project		
I understand my personal details such as name, phone number, address and email address etc., will not be revealed to anyone.	☐	☐
I understand and agree that my words may be quoted in publications, reports, web pages, and other research outputs. I understand that I will not be named in these outputs unless I specifically request this.	☐	☐
I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐
I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐
I agree for this interview to be tape-recorded. I understand that the audio recording made of this interview will be used for verbatim transcription by a professional transcription service and for analysis by the researcher.	☐	☐
So that the information you provide can be used legally by the researchers		
I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield.	☐	☐

Project contact details for further information:
Researcher: Hanadi Alshamlan
PhD Researcher at Sheffield University Management School
E-mail: hmalshamlan1@sheffield.ac.uk
Mobile No:

If you are unhappy about any aspect of the research process, please contact the research supervisor, Dr John Brierley at j.a.brierley@sheffield.ac.uk. If you feel that any complaint has not been handled satisfactorily you should contact the Head of Accounting and Financial Management Division, Professor Shuxing Yin at shuxing.yin@sheffield.ac.uk

Appendix 5.3: The interview participant information sheet

16. Research Project Title:

The Determinants of Costing Systems, and Costing Systems' Impact on Performance.

17. Invitation paragraph

After ticking the box on the back cover of the questionnaire titled 'The Determinants of Costing Systems, and Costing Systems' Impact on Performance' at the end of 2018, you are being invited to take part in a research project. Before you decide whether or not to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

18. What is the project's purpose?

This research aims to obtain data to examine which contingent variables are associated with activity-based costing (ABC) adoption, activity management (AM) usage and cost system sophistication (CSS), and how these influence financial and non-financial performance in UK non-manufacturing companies. The research aims to conduct follow up interviews with questionnaire respondents to determine their views about the relationships observed from testing the research models.

19. Why have I been chosen?

You have been selected initially from the Financial Analysis Made Easy (FAME) database to take part in this research and you ticked a box on the back cover of the questionnaire to say that you are willing to take part in a research interview that looks at the results of analysing the questionnaires and obtain reasons for the results obtained.

20. Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be asked to sign a consent form and you can still withdraw at any time without any negative consequences. You do not have to give a reason. If you do wish to take part in a research interview and do not want the researcher to contact you again about this matter, then please contact the researcher, Mrs Hanadi Alshamlan at hmalshamlan1@sheffied.ac.uk

21. What will happen to me if I take part? What do I have to do?

If you decide to take part in the interviews you will be asked questions about the results of the questionnaire survey, including not only the generalised results from analysing the returned questionnaires, such as significant and non-significant relationships and unexpected results; but also your individual questionnaire responses. The interviews should last for about 60 to 90 minutes.

22. What are the possible disadvantages and risks of taking part?

The research does not pose any disadvantages or risks for participants involved in the research.

23. What are the possible benefits of taking part?

Whilst there are no immediate benefits for those participating in the project, it is hoped that this work will have a beneficial impact on UK non-manufacturing companies.

24. Will my taking part in this project be kept confidential?

All the information that we collect about you during the course of the research will be kept strictly confidential and will only be accessible by Hanadi Alshamlan. You will not be able to be identified in any reports or publications unless you have given your explicit consent for this. If you agree to us sharing the information you provide with other researchers (e.g. by making it available in a data archive) then your personal details will not be included unless you explicitly request this.

25. What is the legal basis for processing my personal data?

According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

26. What will happen to the data collected, and the results of the research project?

The interview data will be analysed by the researcher using statistical software. The analysis will take place at the University of Sheffield. The researcher would like to record the interview. The recorded interview will be saved on a memory card and kept in a locker that has been provided by the University of Sheffield. The interview data will be transcribed verbatim by a professional transcription service and then the interview data will be analysed by the researcher. The data from the interview will only be used for the PhD research. In addition, the data will not be used for any research projects except for the current PhD research, conference papers, and academic journal papers. You will not be identified in any of these publications. The data will be stored for the duration of those projects and will be destroyed after they have been completed. Due to the nature of this research, it is very likely that other researchers may find the data collected to be useful in answering future research questions. We will ask for your explicit consent for your data to be shared in this way.

27. Who is organising and funding the research?

This research is funded by Royal Embassy of Saudi Arabia Cultural Bureau in London.

28. Who is the Data Controller?

The University of Sheffield will act as the data controller for this study. This means that the University of Sheffield is responsible for looking after your information and using it properly.

29. Who has ethically reviewed the project?

This project has been ethically approved via the University of Sheffield's Ethics Review Procedure, as administered at Sheffield University Management School.

30. What if something goes wrong and I wish to complain about the research?

If you are unhappy about any aspect of the research process, please contact the research supervisor, Dr John Brierley, at j.a.brierley@sheffield.ac.uk. If you feel that any complaint has not been handled satisfactorily you should contact the Head of Accounting and Financial Management Division, Professor Shuxing Yin at shuxing.yin@sheffield.ac.uk

31. Contact for further information

If you wish to obtain further information about the research, please feel free to e-mail the researcher Mrs Hanadi Alshamlan at hmalshamlan1@sheffield.ac.uk or contact the research supervisor, Dr John Brierley, at j.a.brierley@sheffield.ac.uk

If you agree to take part in the research interview, at the start of the interview you will be asked to complete a signed consent form to keep for your records.

Appendix 5.4: The first interview letter

Potential interviewer's address

04 February 2019

Dear Sir/Madam,

Thank you for completing the questionnaire I sent you recently about the costing systems of non-manufacturing companies. I note that you have agreed to take part in a follow on research interview about costing systems and after I have analysed the results of the questionnaires I will contact you to arrange an interview sometime before the end of 2019.

Thank you for your help and cooperation, and I look forward to meeting you later on this year.

Yours sincerely,

Hanadi Alshamlan
PhD researcher
Sheffield University Management School

Appendix 5.5: The second interview letter

Potential interviewer's address

10 September 2019

Dear Sir/Madam,

Thank you for completing the questionnaire about costing systems in non-manufacturing companies which I received in October 2018. On the back cover of the questionnaire, I note that you ticked the box to take part in a follow up research interview about costing systems. I am currently analysing the questionnaire responses and when I have completed this, I will contact you to arrange the interview. I anticipate that the interview will take place sometime before the end of the year.

If you have any queries in the meantime, please feel free to contact me at hmalshamlan1@sheffield.ac.uk

Yours sincerely,

Hanadi Alshamlan
PhD researcher
Sheffield University Management School

Appendix 5.6: The third interview letter

Potential interviewer's address

24 October 2019

Dear Sir/Madam,

Further to my letter of 10 September that related to your response to my questionnaire about costing systems in non-manufacturing industry. On the back cover of the questionnaire, I note that you ticked the box to take part in a follow up research interview about my research. I would now like to arrange a time for me to visit your premises in November or December to discuss your responses to the questionnaire, the results of analysing the questionnaires and the reasons for the results obtained. More information about the research interview is provided in the enclosed participant information sheet. If you have any queries about the research interview and to arrange this meeting, I would be grateful if you could please contact me either by email at hmalshamlan1@sheffield.ac.uk or by phone at .

Yours sincerely,

Hanadi Alshamlan
PhD researcher
Sheffield University Management School

Appendix 6: The ethical approval

Downloaded: 18/04/2018 Approved: 18/04/2018

Hanadi Alshamlan
Registration number: 160262506 Management School Programme: PhD accounting

Dear Hanadi

PROJECT TITLE: The Determinants of Costing Systems, and Costing Systems Impact on Performance
APPLICATION: Reference Number 018573

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 18/04/2018 the above-named project was approved on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 018573 (dated 17/04/2018). Participant information sheet 1041674 version 3 (17/04/2018).
- Participant information sheet 1041675 version 3 (17/04/2018). Participant information sheet 1041676 version 3 (17/04/2018). Participant information sheet 1041677 version 3 (17/04/2018). Participant consent form 1041680 version 3 (17/04/2018).
- Participant consent form 1041678 version 3 (17/04/2018). Participant consent form 1041682 version 3 (17/04/2018). Participant consent form 1041681 version 3 (17/04/2018).

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Yours sincerely

Lucy Bartrick
Ethics Administrator Management School

Appendices 7: The preliminary results and descriptive data

Appendix 7.1: The standardise scores of ordinal and interval variables in univariate outliers

Variables	Highest standardises scores	Lowest standardises scores	Action	Transformation Highest z score	Transformation Lowest z score
AA usage	+ 1.83	-0.99	Same variable	No action needed	
ACA usage	+ 1.73	-1.11	Same variable	No action needed	
ABC usage	+ 1.67	-0.93	Same variable	No action needed	
Competition	+ 1.97	-2.29	Same variable	No action needed	
Differentiation strategy	+ 1.85	-1.94	Same variable	No action needed	
Cost leadership strategy	+ 2.15	-2.05	Same variable	No action needed	
Service diversity	+ 2.26	-2.29	Same variable	No action needed	
Service cycle time reduction	+ 2.07	-2.24	Same variable	No action needed	
Service quality	+ 1.84	-2.47	Same variable	No action needed	
Cost reduction	+2.29	-1.69	Same variable	No action needed	
Financial performance	+2.22	-2.00	Same variable	No action needed	
Cost pools	≥ 3	-0.60	Transformed variable	+1.75	-0.916
Cost drivers	≥ 3	-0.46	Transformed variable	+2.33	-0.76
Volume cost drivers	≥ 3	-0.49	Transformed variable	+2.35	-0.78
Non-volume cost drivers	≥ 3	-0.37	Transformed variable	+2.53	-0.48
Cost structure	≥ 3	-1.41	Winsorized variable	No action needed	
Number of employees	≥ 3	-0.42	Transformed variable	+1.81	-1.85
Sales revenue	≥ 3	-0.35	Transformed variable	+1.95	-1.67
Capital employed	≥ 3	-0.30	Transformed variable	+1.56	-3.56

Appendix 7.2: The Normality Test

Variables	Skewness	Kurtosis
ABC adoption	0.85	**-1.30**
AA usage	0.48	**-1.19**
ACA usage	0.32	**-1.29**
ABC usage	0.64	**-1.15**
Cost pools[a]	0.40	**-1.53**
Cost drivers[a]	**1.18**	0.06
Volume cost drivers[a]	**1.17**	0.23
Non-Volume cost drivers[a]	**1.73**	**1.33**
Competition	0.27	-0.58
Differentiation strategy	0.14	-0.76
Cost leadership strategy	-0.20	-0.98
Service diversity	0.36	-0.48
Service cycle time reduction	0.35	-0.79
Service quality	-0.03	**-1.08**
Cost reduction	0.34	-0.49
Financial performance	0.42	-0.62
Cost structure	0.11	-0.91
Number of employees[a]	0.11	-0.91
Sales revenue[a]	0.43	-0.79
Capital employed[a]	-0.47	0.12

[a] The variable presented in this table is transformed by using Log N

Appendix 7.3: Transformed size indicators by using Log N

	Mean	Median	Std. Deviation
SIZE_1: Number of employees	2.79	2.78	0.59
SIZE_2: Sales revenue	8.11	8.06	0.51
SIZE_3: Capital employed	6.96	7.12	0.60

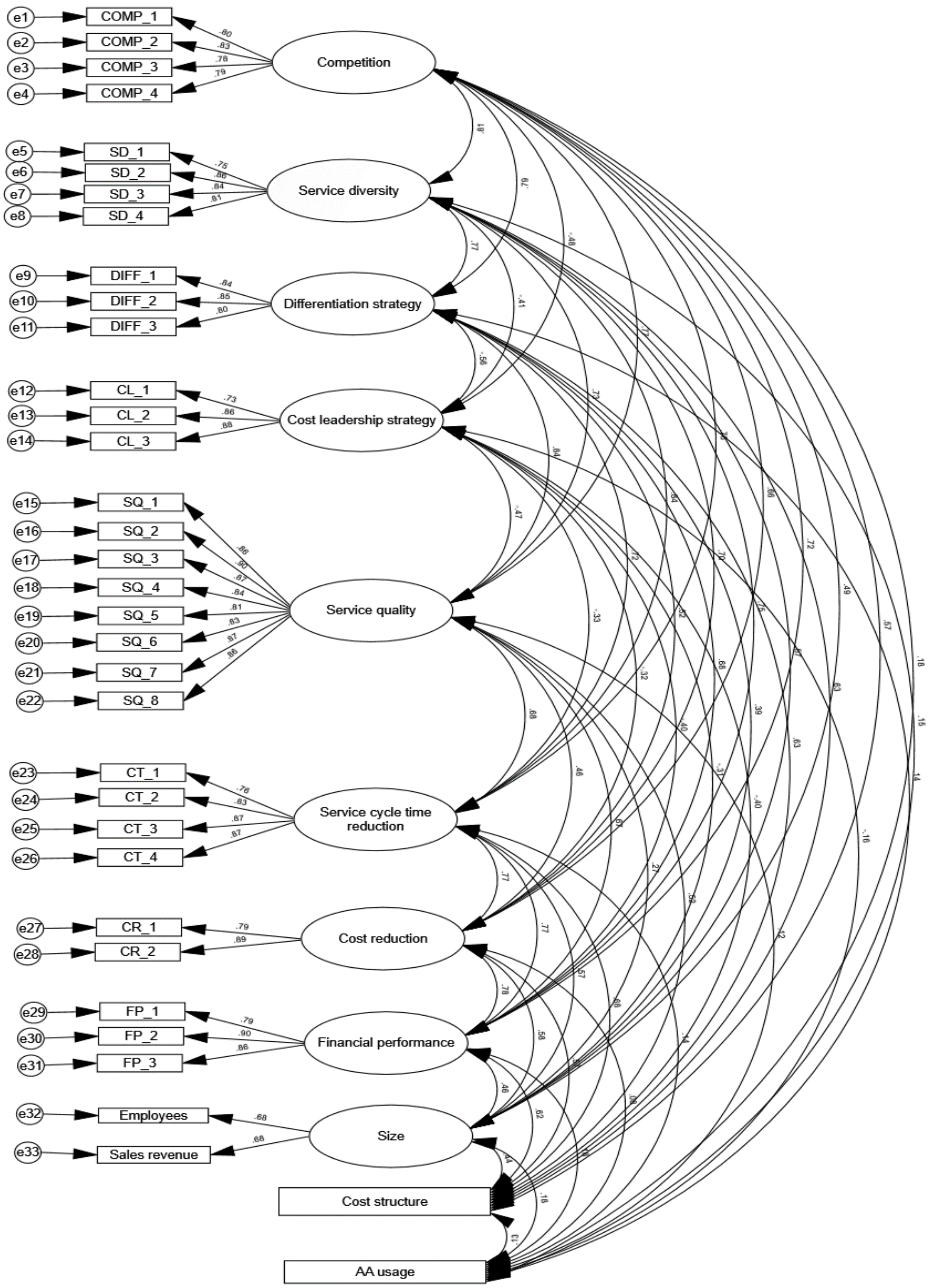
Appendices 8: The measurement model findings

Appendix 8.1: Modification for the ABC adoption measurement model

			M.I.	Par Change				M.I.	Par Change
e5	<-->	Service quality	23.52	-0.10	e6	<-->	e10	5.87	0.07
e6	<-->	e5	21.51	0.13	e9	<-->	Competition	5.86	0.07
e8	<-->	e7	18.41	0.12	e10	<-->	e27	5.78	-0.08
e7	<-->	e10	17.95	-0.13	e13	<-->	Service quality	5.76	0.05
e11	<-->	e13	17.08	-0.15	e4	<-->	Financial performance	5.76	0.06
e1	<-->	e9	16.07	0.14	e3	<-->	e33	5.70	-0.06
e1	<-->	Service quality	15.60	0.09	e3	<-->	e19	5.70	0.09
e21	<-->	e20	14.34	0.09	e5	<-->	Differentiation strategy	5.59	0.06
e5	<-->	e10	13.34	0.12	e11	<-->	e20	5.59	-0.08
e7	<-->	Service quality	12.62	0.07	e7	<-->	e26	5.47	-0.06
e26	<-->	e25	12.04	0.09	e18	<-->	e23	5.43	0.06
e9	<-->	e13	11.92	0.11	e12	<-->	e16	5.43	0.05
e2	<-->	e27	11.87	0.11	e7	<-->	e9	5.43	0.07
e9	<-->	e31	10.72	-0.10	e2	<-->	e5	5.25	0.07
e7	<-->	e5	10.22	-0.09	e28	<-->	e31	5.22	0.07
e4	<-->	e1	9.92	-0.11	e3	<-->	Size	5.18	-0.13
e19	<-->	e18	9.79	0.09	e15	<-->	ABC adoption	5.08	-0.02
e11	<-->	e25	9.71	0.11	e12	<-->	Differentiation strategy	5.07	-0.06
e8	<-->	e5	9.57	-0.09	e9	<-->	e20	5.05	0.07
e13	<-->	e26	9.54	-0.09	e1	<-->	e5	5.03	-0.07
e18	<-->	ABC adoption	9.43	0.04	e13	<-->	e31	5.02	-0.07
e1	<-->	e12	9.28	-0.11	e23	<-->	e27	4.87	0.07
e8	<-->	e6	9.24	-0.08	e1	<-->	e31	4.87	-0.07
e11	<-->	e27	9.13	0.11	e22	<-->	e21	4.85	0.05
e23	<-->	e24	8.57	0.08	e21	<-->	e16	4.80	-0.04
e1	<-->	e33	8.56	0.07	e1	<-->	e13	4.76	0.07
e5	<-->	e23	8.49	0.08	e5	<-->	e9	4.67	-0.07
e7	<-->	e21	8.41	0.07	e26	<-->	Size	4.64	-0.10
e6	<-->	e23	8.39	0.08	e32	<-->	e27	4.59	0.05
e17	<-->	e27	8.21	-0.08	e21	<-->	e26	4.56	-0.05
e9	<-->	e12	8.09	-0.10	e22	<-->	e28	4.45	0.06
e4	<-->	Service quality	7.72	-0.06	e4	<-->	e5	4.44	0.07
e24	<-->	e30	7.71	0.08	e17	<-->	e23	4.43	-0.05
e11	<-->	e14	7.66	0.11	e6	<-->	e9	4.43	-0.06
e16	<-->	e26	7.61	0.06	e11	<-->	e9	4.36	-0.08
e1	<-->	e15	7.38	0.07	e4	<-->	Service diversity	4.34	0.04
e14	<-->	Differentiation strategy	7.34	0.08	e8	<-->	e14	4.23	-0.07
e23	<-->	Service diversity	7.32	0.05	e11	<-->	Competition	4.23	-0.06
e2	<-->	e25	7.31	-0.08	e13	<-->	e32	4.21	-0.04
e21	<-->	e19	7.27	-0.07	e15	<-->	Size	4.11	0.08
e9	<-->	Service quality	7.18	0.06	e2	<-->	e32	4.10	0.05
e12	<-->	Service quality	6.92	-0.06	e10	<-->	Service quality	4.10	-0.05
e26	<-->	e23	6.71	-0.07	e14	<-->	Competition	4.08	-0.06
e11	<-->	e24	6.38	-0.09	e5	<-->	e27	4.08	0.06
e1	<-->	e17	6.12	0.07	e13	<-->	Cost reduction	4.05	-0.05
e7	<-->	Service cycle time	6.09	-0.04	e17	<-->	Competition	4.04	0.04
e27	<-->	Size	6.01	0.12	e8	<-->	e10	4.01	-0.06
e5	<-->	Competition	5.97	0.06					
e31	<-->	Cost reduction	5.93	0.06					

Appendix 8.2 The AA usage measurement model

Appendix 8.2.1: The CFA measurement model for the AA usage after factor loading consideration



Appendix 8.2.2: The regression weight for the the AA usage measurement model after factor loading consideration

			Unstandardized regression weight	S.E.	C.R.	p	Standardised regression weight
COMP_1	<---	Competition	1.00				0.80
COMP_2	<---	Competition	1.03	0.08	13.04	0.00*	0.83
COMP_3	<---	Competition	0.98	0.08	11.99	0.00*	0.78
COMP_4	<---	Competition	0.98	0.08	12.27	0.00*	0.79
SD_1	<---	Service diversity	1.00				0.75
SD_2	<---	Service diversity	1.28	0.10	12.64	0.00*	0.86
SD_3	<---	Service diversity	1.24	0.10	12.47	0.00*	0.85
SD_4	<---	Service diversity	1.20	0.10	11.92	0.00*	0.81
DIFF_1	<---	Differentiation strategy	1.00				0.84
DIFF_2	<---	Differentiation strategy	1.02	0.07	14.72	0.00*	0.85
DIFF_3	<---	Differentiation strategy	0.99	0.07	13.61	0.00*	0.80
CL_2	<---	Cost leadership strategy	1.35	0.12	11.35	0.00*	0.86
CL_1	<---	Cost leadership strategy	1.00				0.73
CL_3	<---	Cost leadership strategy	1.61	0.14	11.48	0.00*	0.88
SQ_1	<---	Service quality	1.00				0.87
SQ_2	<---	Service quality	1.13	0.06	18.48	0.00*	0.90
SQ_3	<---	Service quality	1.13	0.07	17.00	0.00*	0.87
SQ_4	<---	Service quality	1.09	0.07	16.14	0.00*	0.84
SQ_5	<---	Service quality	1.09	0.07	14.90	0.00*	0.81
SQ_6	<---	Service quality	1.07	0.07	15.84	0.00*	0.84
SQ_7	<---	Service quality	1.15	0.07	17.27	0.00*	0.87
SQ_8	<---	Service quality	1.20	0.07	16.94	0.00*	0.87
CT_1	<---	Service cycle time reduction	1.00				0.76
CT_2	<---	Service cycle time reduction	1.24	0.10	12.54	0.00*	0.83
CT_3	<---	Service cycle time reduction	1.36	0.10	13.25	0.00*	0.87
CT_4	<---	Service cycle time reduction	1.39	0.11	13.28	0.00*	0.87
CR_1	<---	Cost reduction	1.00				0.79
CR_2	<---	Cost reduction	1.35	0.11	12.73	0.00*	0.89
FP_1	<---	Financial performance	1.00				0.79
FP_2	<---	Financial performance	1.33	0.09	14.36	0.00*	0.90
FP_3	<---	Financial performance	1.29	0.09	13.74	0.00*	0.86
Employees	<---	Size	0.38	0.03	12.06	0.00*	0.69
Sales revenue	<---	Size	0.38	0.03	12.06	0.00*	0.68

* p value < 0.001 (two-tailed).

Appendix 8.2.3.: CFA's fitness indices for the AA usage measurement model

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 1019.030$, $p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	χ^2/df=2.01	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.07	Satisfied
	df	> 0	df = 508	Satisfied
	SRMR	≤ 0.08	SRMR = 0.06	Satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.91	Satisfied
	IFI	≥ 0.90	IFI = 0.91	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.89	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.72	Satisfied

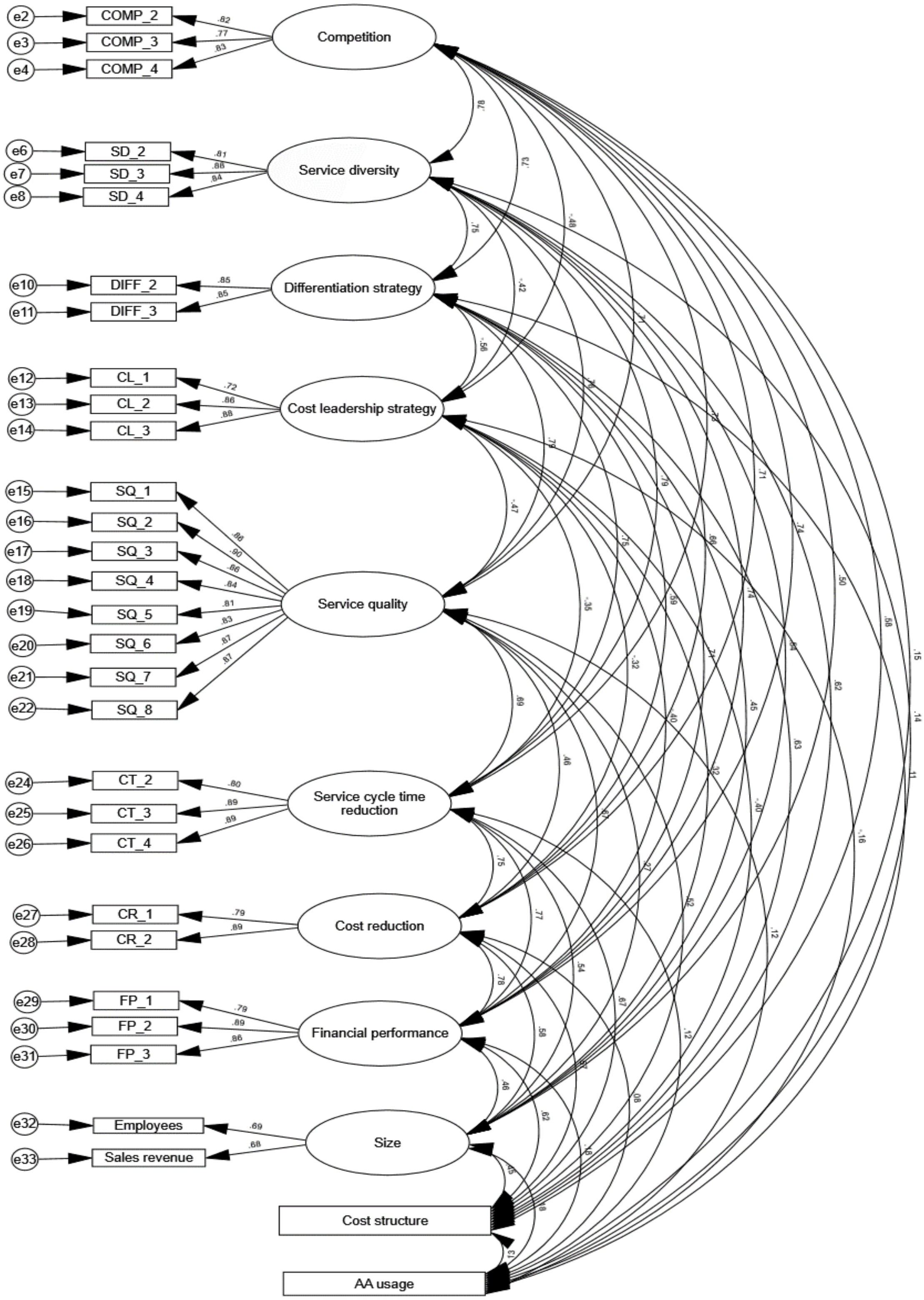
Appendix 8.2.4: Modification indices for the AA usage measurement model

			M.I.	Par Change				M.I.	Par Change
e5	<-->	Service quality	23.29	-0.10	e27	<-->	Size	5.90	0.12
e6	<-->	e5	21.56	0.13	e12	<-->	e16	5.72	0.05
e8	<-->	e7	18.51	0.12	e3	<-->	e19	5.70	0.08
e7	<-->	e10	18.11	-0.13	e5	<-->	Differentiation strategy	5.69	0.06
e11	<-->	e13	17.44	-0.15	e5	<-->	Competition	5.69	0.06
e1	<-->	e9	15.39	0.14	e13	<-->	Service quality	5.62	0.05
e1	<-->	Service quality	15.24	0.09	e11	<-->	e20	5.54	-0.08
e21	<-->	e20	14.22	0.09	e10	<-->	e27	5.43	-0.08
e5	<-->	e10	13.69	0.12	e9	<-->	Competition	5.41	0.06
e2	<-->	e27	12.81	0.12	e3	<-->	e33	5.39	-0.06
e9	<-->	e13	12.19	0.11	e18	<-->	e23	5.38	0.06
e26	<-->	e25	12.09	0.09	e1	<-->	e5	5.35	-0.08
e7	<-->	Service quality	11.98	0.07	e28	<-->	e31	5.33	0.07
e9	<-->	e31	10.92	-0.10	e2	<-->	e5	5.32	0.07
e7	<-->	e5	10.54	-0.09	e7	<-->	e26	5.31	-0.06
e19	<-->	e18	10.06	0.09	e9	<-->	e20	5.18	0.07
e4	<-->	e1	9.94	-0.11	e13	<-->	e31	5.10	-0.07
e13	<-->	e26	9.68	-0.09	e15	<-->	e28	5.06	-0.06
e11	<-->	e25	9.48	0.10	e4	<-->	Service diversity	4.99	0.05
e8	<-->	e5	9.37	-0.09	e21	<-->	e16	4.96	-0.04
e1	<-->	e12	9.27	-0.10	e1	<-->	e13	4.95	0.07
e11	<-->	e27	9.21	0.11	e1	<-->	e31	4.90	-0.07
e8	<-->	e6	8.94	-0.08	e7	<-->	e9	4.87	0.07
e23	<-->	e24	8.54	0.08	e1	<-->	Cost reduction	4.86	-0.06
e7	<-->	e21	8.51	0.07	e23	<-->	e27	4.84	0.07
e1	<-->	e33	8.42	0.07	e16	<-->	AA usage	4.83	0.10
e17	<-->	e27	8.41	-0.08	e32	<-->	e27	4.83	0.05
e5	<-->	e23	8.32	0.08	e22	<-->	e21	4.80	0.05
e6	<-->	e23	8.12	0.08	e11	<-->	e9	4.80	-0.08
e16	<-->	e26	7.65	0.06	e5	<-->	e9	4.80	-0.07
e24	<-->	e30	7.59	0.07	e15	<-->	Cost reduction	4.76	-0.04
e4	<-->	Service quality	7.59	-0.06	e13	<-->	Cost reduction	4.75	-0.05
e9	<-->	e12	7.57	-0.09	e3	<-->	Size	4.64	-0.12
e11	<-->	e14	7.53	0.11	e6	<-->	e9	4.61	-0.06
e2	<-->	e25	7.29	-0.08	e4	<-->	e5	4.53	0.07
e21	<-->	e19	7.20	-0.07	e21	<-->	e26	4.52	-0.05
e1	<-->	e15	7.13	0.07	e26	<-->	Size	4.49	-0.10
e14	<-->	Differentiation strategy	6.93	0.08	e22	<-->	e28	4.46	0.06
e23	<-->	Service diversity	6.76	0.05	e17	<-->	e23	4.44	-0.05
e9	<-->	Service quality	6.76	0.06	e8	<-->	e14	4.44	-0.07
e26	<-->	e23	6.72	-0.07	e12	<-->	Differentiation strategy	4.42	-0.06
e6	<-->	e10	6.35	0.08	e10	<-->	e28	4.35	0.07
e20	<-->	AA usage	6.33	-0.15	e5	<-->	e27	4.28	0.06
e12	<-->	Service quality	6.29	-0.05	e17	<-->	Competition	4.20	0.04
e31	<-->	Cost reduction	6.26	0.06	e11	<-->	Competition	4.19	-0.06
e11	<-->	e24	6.24	-0.09	e13	<-->	e32	4.15	-0.04
e4	<-->	Financial performance	6.24	0.06	e4	<-->	e8	4.05	0.07
e1	<-->	e17	6.17	0.07	e10	<-->	e16	4.03	0.00
e7	<-->	Service cycle time	6.10	-0.04					

Appendix 8.2.5: AVE, MSV, and ASV for the AA usage measurement model

Latent constructs	AVE	MSV	ASV
1 Cost structure	1.00	0.46	0.29
2 AA usage	1.00	0.03	0.02
3 Financial performance	0.72	0.61	0.40
4 Cost reduction	0.71	0.61	0.34
5 Service cycle time reduction	0.69	0.71	0.44
6 Service quality	0.74	0.71	0.36
7 Size	0.47	0.33	0.20
8 Cost leadership strategy	0.68	0.31	0.16
9 Differentiation strategy	0.69	0.71	0.41
10 Service diversity	0.67	0.71	0.44
11 Competition	0.64	0.65	0.42

Appendix 8.2.6: The CFA measurement model for the AA usage after diagnostics



Appendix 8.2.7: The regression weight for the AA usage measurement model after diagnostices

			Unstandardized regression weight	S.E.	C.R.	p	Standardised regression weight
COMP_2	<---	Competition	1.00				0.82
COMP_3	<---	Competition	0.95	0.08	11.97	0.00*	0.77
COMP_4	<---	Competition	1.01	0.08	13.22	0.00*	0.83
SD_2	<---	Service diversity	1.00				0.81
SD_3	<---	Service diversity	1.07	0.07	14.64	0.00*	0.88
SD_4	<---	Service diversity	1.03	0.07	13.79	0.00*	0.84
DIFF_2	<---	Differentiation strategy	1.00				0.85
DIFF_3	<---	Differentiation strategy	1.02	0.07	13.81	0.00*	0.85
CL_1	<---	Cost leadership strategy	1.00				0.72
CL_2	<---	Cost leadership strategy	1.36	0.12	11.33	0.00*	0.86
CL_3	<---	Cost leadership strategy	1.61	0.14	11.43	0.00*	0.88
SQ_1	<---	Service quality	1.00				0.86
SQ_2	<---	Service quality	1.13	0.06	18.49	0.00*	0.90
SQ_3	<---	Service quality	1.13	0.07	16.93	0.00*	0.86
SQ_4	<---	Service quality	1.09	0.07	16.17	0.00*	0.84
SQ_5	<---	Service quality	1.09	0.07	14.92	0.00*	0.81
SQ_6	<---	Service quality	1.07	0.07	15.80	0.00*	0.83
SQ_7	<---	Service quality	1.15	0.07	17.27	0.00*	0.87
SQ_8	<---	Service quality	1.20	0.07	16.95	0.00*	0.87
CT_2	<---	Service cycle time reduction	1.00				0.80
CT_3	<---	Service cycle time reduction	1.16	0.08	14.66	0.00*	0.89
CT_4	<---	Service cycle time reduction	1.18	0.08	14.73	0.00*	0.89
CR_1	<---	Cost reduction	1.00				0.79
CR_2	<---	Cost reduction	1.35	0.11	12.69	0.00*	0.89
FP_1	<---	Financial performance	1.00				0.79
FP_2	<---	Financial performance	1.32	0.09	14.38	0.00*	0.89
FP_3	<---	Financial performance	1.29	0.09	13.78	0.00*	0.86
Employees	<---	Size	0.38	0.03	12.07	0.00*	0.69
Sales revenue	<---	Size	0.38	0.03	12.07	0.00*	0.68

* p value < 0.001 (two-tailed).

Appendix 8.2.8: CFA's fitness indices for the AA usage measurement model after diagnostics

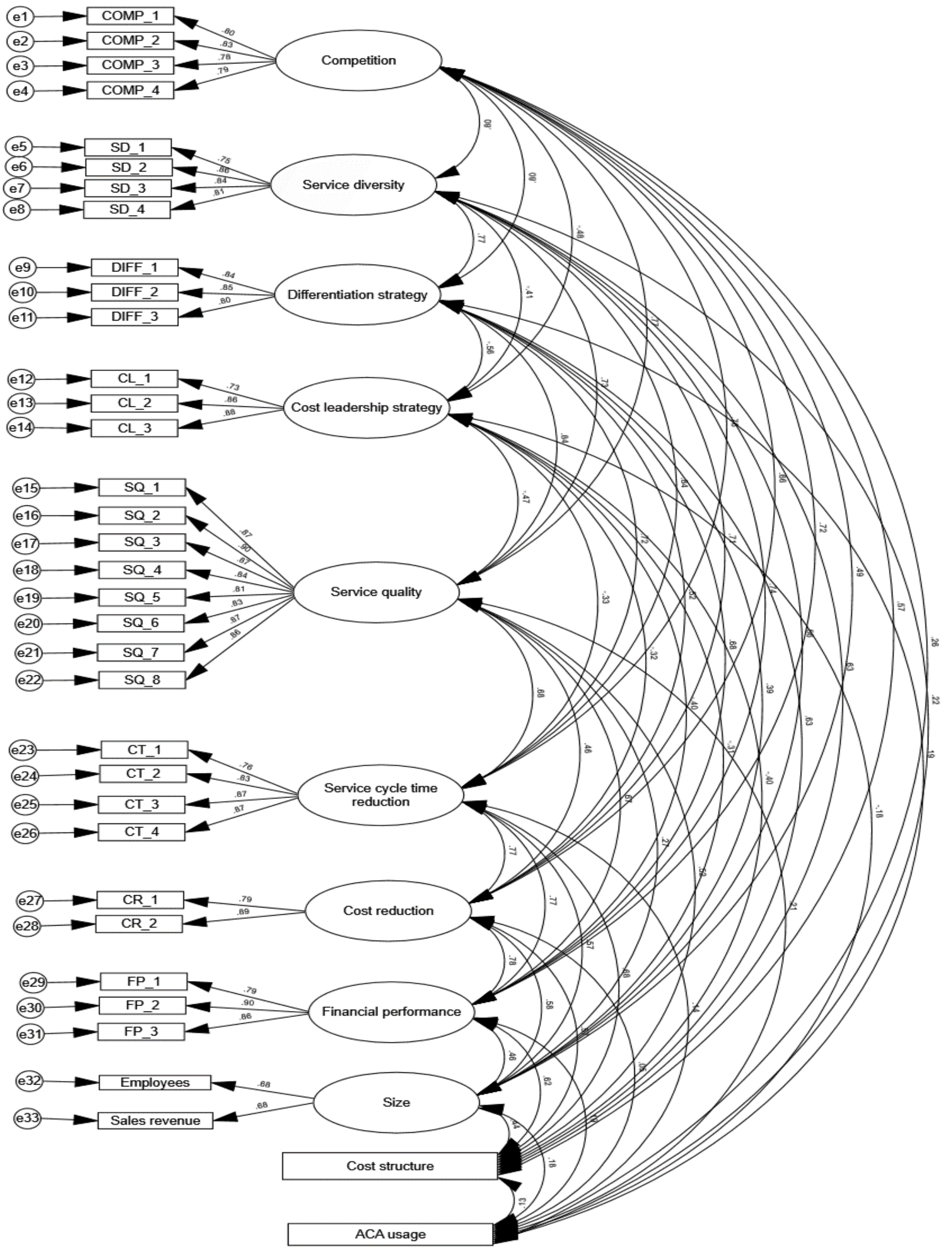
Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 662.226, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 1.73$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.06	Satisfied
	df	> 0	$df = 382$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.06	Satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.94	Satisfied
	IFI	≥ 0.90	IFI = 0.94	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.93	Satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.72	Satisfied

Appendix 8.2.9: AVE, MSV, and ASV for the AA usage measurement model after diagnostics

Latent constructs	AVE	MSV	ASV
1 Cost structure	1.00	0.46	0.29
2 AA usage	1.00	0.03	0.02
3 Financial performance	0.72	0.61	0.40
4 Cost reduction	0.71	0.61	0.34
5 Service cycle time reduction	0.74	0.63	0.42
6 Service quality	0.74	0.63	0.34
7 Size	0.47	0.34	0.20
8 Cost leadership strategy	0.68	0.32	0.16
9 Differentiation strategy	0.72	0.63	0.41
10 Service diversity	0.72	0.63	0.42
11 Competition	0.65	0.61	0.41

Appendix 8.3 The ACA usage measurement model

Appendix 8.3.1: The CFA measurement model for the ACA usage model after factor loading consideration



Appendix 8.3.2: The regression weight for the ACA usage measurement model after factor loading consideration

			Unstandardized regression weight	S.E.	C.R.	*p*	Standardised regression weight
COMP_1	<---	Competition	1				0.8
COMP_2	<---	Competition	1.02	0.08	13.09	0.00*	0.83
COMP_3	<---	Competition	0.97	0.08	12.05	0.00*	0.78
COMP_4	<---	Competition	0.98	0.08	12.3	0.00*	0.79
SD_1	<---	Service diversity	1				0.75
SD_2	<---	Service diversity	1.28	0.1	12.71	0.00*	0.86
SD_3	<---	Service diversity	1.24	0.1	12.49	0.00*	0.84
SD_4	<---	Service diversity	1.19	0.1	11.92	0.00*	0.81
DIFF_1	<---	Differentiation strategy	1				0.84
DIFF_2	<---	Differentiation strategy	1.02	0.07	14.73	0.00*	0.85
DIFF_3	<---	Differentiation strategy	0.99	0.07	13.61	0.00*	0.8
CL_1	<---	Cost leadership strategy	1				0.73
CL_2	<---	Cost leadership strategy	1.35	0.12	11.35	0.00*	0.86
CL_3	<---	Cost leadership strategy	1.61	0.14	11.49	0.00*	0.88
SQ_1	<---	Service quality	1				0.87
SQ_2	<---	Service quality	1.13	0.06	18.52	0.00*	0.9
SQ_3	<---	Service quality	1.13	0.07	17.01	0.00*	0.87
SQ_4	<---	Service quality	1.09	0.07	16.15	0.00*	0.84
SQ_5	<---	Service quality	1.09	0.07	14.91	0.00*	0.81
SQ_6	<---	Service quality	1.07	0.07	15.83	0.00*	0.83
SQ_7	<---	Service quality	1.15	0.07	17.27	0.00*	0.87
SQ_8	<---	Service quality	1.2	0.07	16.96	0.00*	0.86
CT_1	<---	Service cycle time reduction	1				0.76
CT_2	<---	Service cycle time reduction	1.24	0.1	12.51	0.00*	0.83
CT_3	<---	Service cycle time reduction	1.36	0.1	13.25	0.00*	0.87
CT_4	<---	Service cycle time reduction	1.39	0.1	13.27	0.00*	0.87
CR_1	<---	Cost reduction	1				0.79
CR_2	<---	Cost reduction	1.34	0.1	12.84	0.00*	0.89
FP_1	<---	Financial performance	1				0.79
FP_2	<---	Financial performance	1.33	0.09	14.35	0.00*	0.9
FP_3	<---	Financial performance	1.29	0.09	13.74	0.00*	0.86
Employees	<---	Size	0.38	0.03	12.05	0.00*	0.68
Sales revenue	<---	Size	0.38	0.03	12.05	0.00*	0.68

* p value < 0.001 (two-tailed).

Appendix 8.3.3.: CFA's fitness indices for the ACA usage measurement model

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 1021.19$, $p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 2.01$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.07	Satisfied
	df	> 0	$df = 508$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.06	Satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.91	Satisfied
	IFI	≥ 0.90	IFI = 0.91	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.90	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.72	Satisfied

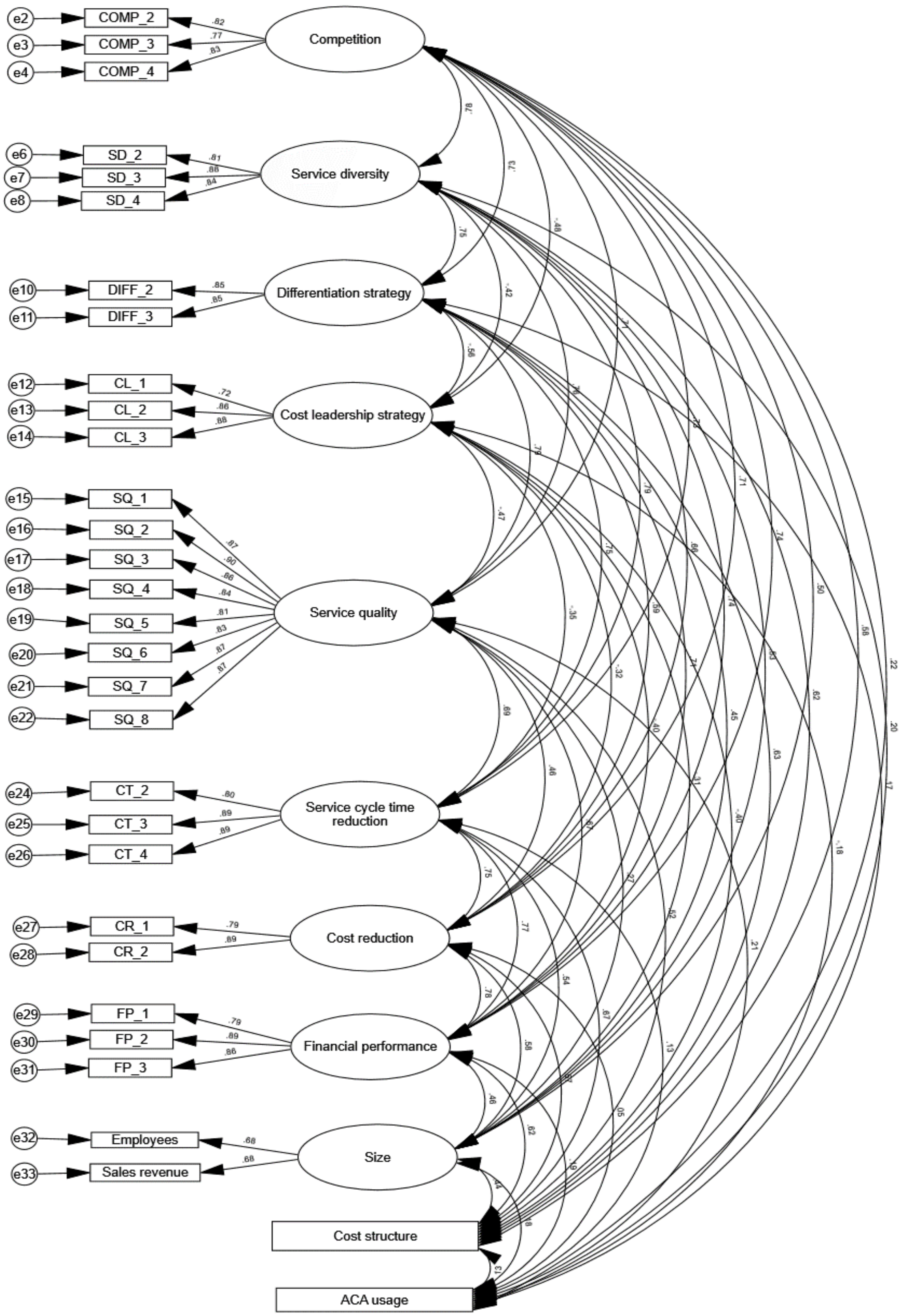
Appendix 8.3.4: Modification indices for the ACA usage measurement model

			M.I.	Par Change				M.I.	Par Change
e5	<-->	Service quality	23.82	-0.1	e12	<-->	e16	5.73	0.05
e6	<-->	e5	20.8	0.12	e3	<-->	e33	5.73	-0.06
e8	<-->	e7	19.38	0.12	e5	<-->	Differentiation strategy	5.69	0.06
e7	<-->	e10	18.13	-0.13	e13	<-->	Service quality	5.63	0.05
e11	<-->	e13	17.32	-0.15	e11	<-->	e20	5.59	-0.08
e1	<-->	e9	15.69	0.14	e1	<-->	e5	5.59	-0.08
e21	<-->	e20	14.54	0.09	e9	<-->	Competition	5.51	0.06
e1	<-->	Service quality	14.43	0.09	e7	<-->	e26	5.41	-0.06
e5	<-->	e10	13.72	0.12	e10	<-->	e27	5.4	-0.08
e2	<-->	e27	12.61	0.11	e5	<-->	Competition	5.36	0.06
e7	<-->	Service quality	12.46	0.07	e18	<-->	e23	5.32	0.06
e9	<-->	e13	12	0.11	e21	<-->	ACA usage	5.3	-0.12
e26	<-->	e25	11.82	0.09	e2	<-->	e5	5.3	0.07
e16	<-->	ACA usage	11.43	0.15	e4	<-->	Service diversity	5.26	0.05
e9	<-->	e31	10.79	-0.1	e13	<-->	e31	5.12	-0.07
e7	<-->	e5	10.65	-0.09	e9	<-->	e20	5.04	0.07
e4	<-->	e1	10.13	-0.12	e28	<-->	e31	5.02	0.07
e19	<-->	e18	10.09	0.09	e21	<-->	e16	4.99	-0.04
e1	<-->	e12	9.55	-0.11	e3	<-->	Size	4.92	-0.12
e13	<-->	e26	9.46	-0.09	e1	<-->	e13	4.9	0.07
e11	<-->	e25	9.39	0.1	e22	<-->	e21	4.89	0.05
e11	<-->	e27	9.27	0.11	e15	<-->	e28	4.88	-0.06
e8	<-->	e5	9.16	-0.09	e7	<-->	e9	4.88	0.07
e8	<-->	e6	8.85	-0.08	e26	<-->	Size	4.86	-0.1
e7	<-->	e21	8.79	0.07	e1	<-->	e31	4.78	-0.07
e23	<-->	e24	8.7	0.08	e11	<-->	e9	4.77	-0.08
e17	<-->	e27	8.42	-0.08	e5	<-->	e9	4.76	-0.07
e1	<-->	e33	8.36	0.07	e23	<-->	e27	4.74	0.06
e5	<-->	e23	8.26	0.08	e21	<-->	e26	4.68	-0.05
e6	<-->	e23	8.14	0.08	e32	<-->	e27	4.64	0.05
e16	<-->	e26	7.98	0.06	e4	<-->	e5	4.58	0.07
e24	<-->	e30	7.61	0.07	e6	<-->	e9	4.53	-0.06
e9	<-->	e12	7.52	-0.09	e22	<-->	e28	4.5	0.06
e11	<-->	e14	7.49	0.11	e17	<-->	e23	4.49	-0.05
e4	<-->	Service quality	7.11	-0.06	e15	<-->	Cost reduction	4.48	-0.04
e2	<-->	e25	7.03	-0.08	e13	<-->	Cost reduction	4.48	-0.05
e21	<-->	e19	7.01	-0.07	e10	<-->	e28	4.38	0.07
e1	<-->	e15	6.94	0.07	e4	<-->	e8	4.38	0.07
e14	<-->	Differentiation strategy	6.76	0.08	e8	<-->	e14	4.37	-0.07
e23	<-->	Service diversity	6.65	0.05	e1	<-->	Cost reduction	4.36	-0.06
e12	<-->	Service quality	6.65	-0.06	e5	<-->	e27	4.33	0.06
e26	<-->	e23	6.59	-0.07	e11	<-->	Competition	4.32	-0.06
e9	<-->	Service quality	6.47	0.06	e17	<-->	Competition	4.31	0.04
e6	<-->	e10	6.47	0.08	e13	<-->	e32	4.3	-0.04
e20	<-->	ACA usage	6.33	-0.14	e12	<-->	Differentiation strategy	4.27	-0.06
e7	<-->	Service cycle time	6.22	-0.04	e8	<-->	ACA usage	4.25	-0.13
e11	<-->	e24	6.2	-0.09	e23	<-->	Service quality	4.24	-0.04
e1	<-->	e17	6.17	0.07	e2	<-->	e32	4.11	0.05
e4	<-->	Financial performance	6.11	0.06	e12	<-->	e26	4.06	0.06
e27	<-->	Size	6.04	0.12					
e31	<-->	Cost reduction	5.78	0.06					
e3	<-->	e19	5.78	0.09					

Appendix 8.3.5: AVE, MSV, and ASV for the ACA usage measurement model

Latent constructs	AVE	MSV	ASV
1 Cost structure	1.00	0.46	0.29
2 ACA usage	1.00	0.07	0.03
3 Financial performance	0.72	0.61	0.40
4 Cost reduction	0.71	0.61	0.34
5 Service cycle time reduction	0.69	0.71	0.44
6 Service quality	0.74	0.71	0.36
7 Size	0.47	0.34	0.20
8 Cost leadership strategy	0.68	0.31	0.16
9 Differentiation strategy	0.69	0.71	0.41
10 Service diversity	0.67	0.71	0.45
11 Competition	0.64	0.65	0.43

Appendix 8.3.6: The CFA measurement model for the ACA usage after diagnostics



Appendix 8.3.7: The regression weight for the ACA usage measurement model after diagnostices

			Unstandardized regression weight	S.E.	C.R.	*p*	Standardised regression weight
COMP_2	<---	Competition	1.00				0.82
COMP_3	<---	Competition	0.95	0.08	12.01	0.00*	0.77
COMP_4	<---	Competition	1.01	0.08	13.23	0.00*	0.83
SD_2	<---	Service diversity	1.00				0.81
SD_3	<---	Service diversity	1.07	0.07	14.68	0.00*	0.88
SD_4	<---	Service diversity	1.03	0.07	13.80	0.00*	0.84
DIFF_2	<---	Differentiation strategy	1.00				0.85
DIFF_3	<---	Differentiation strategy	1.03	0.07	13.81	0.00*	0.85
CL_1	<---	Cost leadership strategy	1.00				0.72
CL_2	<---	Cost leadership strategy	1.36	0.12	11.33	0.00*	0.86
CL_3	<---	Cost leadership strategy	1.61	0.14	11.44	0.00*	0.88
SQ_1	<---	Service quality	1.00				0.87
SQ_2	<---	Service quality	1.13	0.06	18.53	0.00*	0.90
SQ_3	<---	Service quality	1.13	0.07	16.94	0.00*	0.86
SQ_4	<---	Service quality	1.09	0.07	16.18	0.00*	0.84
SQ_5	<---	Service quality	1.09	0.07	14.92	0.00*	0.81
SQ_6	<---	Service quality	1.07	0.07	15.79	0.00*	0.83
SQ_7	<---	Service quality	1.15	0.07	17.26	0.00*	0.87
SQ_8	<---	Service quality	1.20	0.07	16.96	0.00*	0.87
CT_2	<---	Service cycle time reduction	1.00				0.80
CT_3	<---	Service cycle time reduction	1.16	0.08	14.67	0.00*	0.89
CT_4	<---	Service cycle time reduction	1.18	0.08	14.71	0.00*	0.89
CR_1	<---	Cost reduction	1.00				0.79
CR_2	<---	Cost reduction	1.34	0.10	12.78	0.00*	0.89
FP_1	<---	Financial performance	1.00				0.79
FP_2	<---	Financial performance	1.32	0.09	14.36	0.00*	0.89
FP_3	<---	Financial performance	1.29	0.09	13.79	0.00*	0.86
Employees	<---	Size	0.38	0.03	12.05	0.00*	0.68
Sales revenue	<---	Size	0.38	0.03	12.05	0.00*	0.68

* *p* value < 0.001 (two-tailed).

Appendix 8.3.8: CFA's fitness indices for the ACA usage measurement model after diagnostics

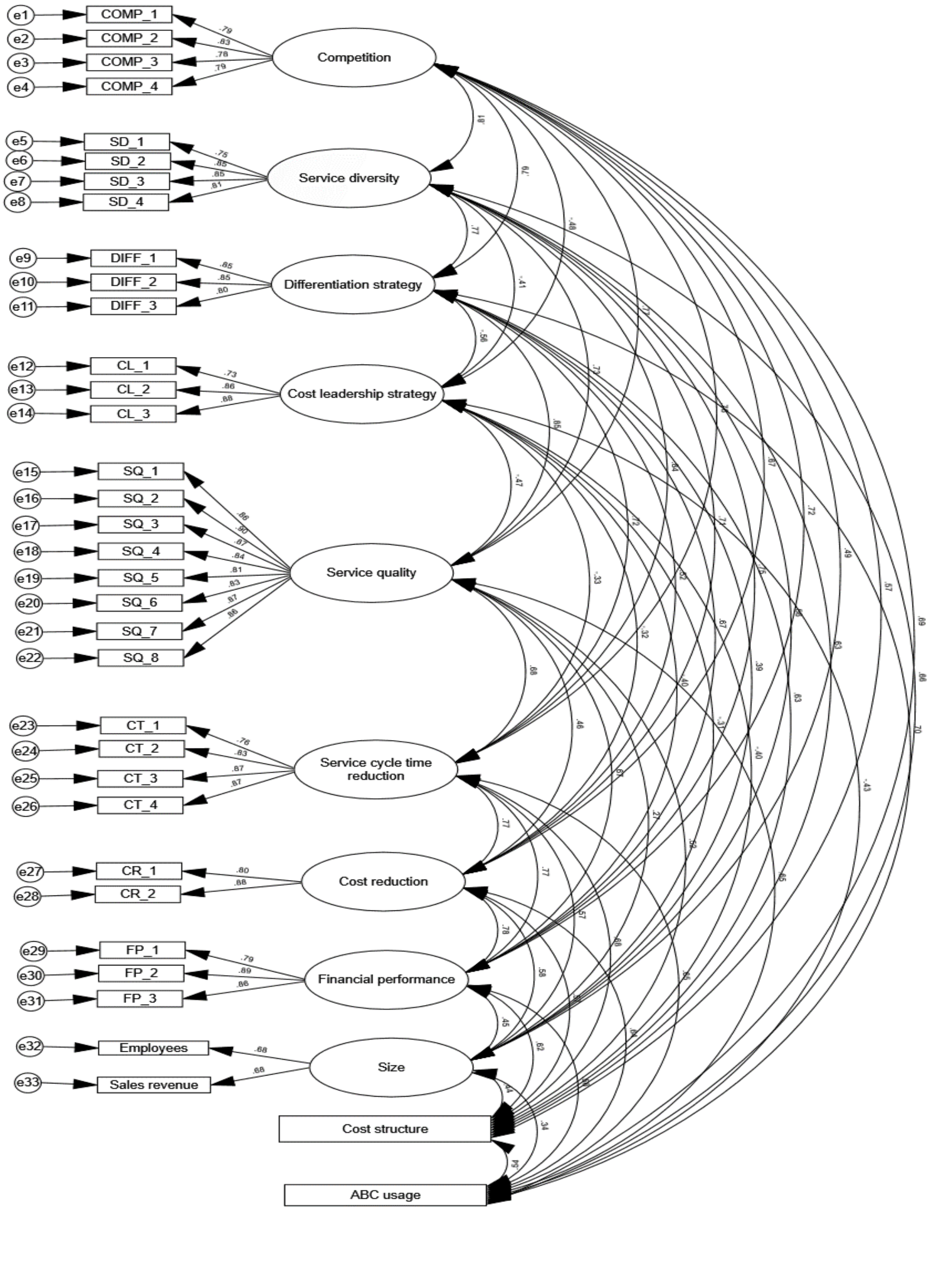
Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 669.965, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 1.76$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.06	Satisfied
	df	> 0	$df = 382$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.06	Satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.94	Satisfied
	IFI	≥ 0.90	IFI = 0.94	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.93	Satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.72	Satisfied

Appendix 8.3.9: AVE, MSV, and ASV for the ACA usage measurement model after diagnostics

Latent constructs	AVE	MSV	ASV
1 Cost structure	1.00	0.46	0.29
2 ACA usage	1.00	0.05	0.03
3 Financial performance	0.72	0.61	0.40
4 Cost reduction	0.71	0.61	0.34
5 Service cycle time reduction	0.74	0.63	0.42
6 Service quality	0.74	0.63	0.35
7 Size	0.47	0.34	0.20
8 Cost leadership strategy	0.68	0.31	0.16
9 Differentiation strategy	0.71	0.63	0.41
10 Service diversity	0.72	0.63	0.43
11 Competition	0.65	0.61	0.41

Appendix 8.4 The ABC usage measurement model

Appendix 8.4.1: The CFA measurement model for the ABC usage after factor loading considiration



Appendix 8.4.2: The regression weight for the ABC usage measurement model after factor loading consideration

			Unstandardized regression weight	S.E.	C.R.	*p*	Standardised regression weight
COMP_1	<---	Competition	1.00				0.79
COMP_2	<---	Competition	1.04	0.08	13.01	0.00*	0.83
COMP_3	<---	Competition	0.99	0.08	11.98	0.00*	0.78
COMP_4	<---	Competition	0.99	0.08	12.19	0.00*	0.79
SD_1	<---	Service diversity	1.00				0.75
SD_2	<---	Service diversity	1.28	0.10	12.60	0.00*	0.85
SD_3	<---	Service diversity	1.24	0.10	12.47	0.00*	0.85
SD_4	<---	Service diversity	1.20	0.10	11.93	0.00*	0.81
DIFF_1	<---	Differentiation strategy	1.00				0.85
DIFF_2	<---	Differentiation strategy	1.02	0.07	14.81	0.00*	0.85
DIFF_3	<---	Differentiation strategy	0.99	0.07	13.61	0.00*	0.80
CL_1	<---	Cost leadership strategy	1.00				0.73
CL_2	<---	Cost leadership strategy	1.35	0.12	11.35	0.00*	0.86
CL_3	<---	Cost leadership strategy	1.61	0.14	11.49	0.00*	0.88
SQ_1	<---	Service quality	1.00				0.86
SQ_2	<---	Service quality	1.13	0.06	18.44	0.00*	0.90
SQ_3	<---	Service quality	1.13	0.07	17.02	0.00*	0.87
SQ_4	<---	Service quality	1.09	0.07	16.14	0.00*	0.84
SQ_5	<---	Service quality	1.09	0.07	14.92	0.00*	0.81
SQ_6	<---	Service quality	1.07	0.07	15.82	0.00*	0.83
SQ_7	<---	Service quality	1.15	0.07	17.25	0.00*	0.87
SQ_8	<---	Service quality	1.20	0.07	16.92	0.00*	0.86
CT_1	<---	Service cycle time reduction	1.00				0.76
CT_2	<---	Service cycle time reduction	1.24	0.10	12.50	0.00*	0.83
CT_3	<---	Service cycle time reduction	1.36	0.10	13.21	0.00*	0.87
CT_4	<---	Service cycle time reduction	1.39	0.11	13.24	0.00*	0.87
CR_1	<---	Cost reduction	1.00				0.80
CR_2	<---	Cost reduction	1.32	0.10	13.18	0.00*	0.88
FP_1	<---	Financial performance	1.00				0.79
FP_2	<---	Financial performance	1.32	0.09	14.34	0.00*	0.89
FP_3	<---	Financial performance	1.29	0.09	13.79	0.00*	0.86
Employees	<---	Size	0.38	0.03	12.03	0.00*	0.68
Sales revenue	<---	Size	0.38	0.03	12.03	0.00*	0.68

* *p* value < 0.001 (two-tailed).

Appendix 8.4.3.: CFA's fitness indices for the ABC usage measurement model

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 1029.83$, $p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 2.00$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.07	Satisfied
	df	> 0	$df = 508$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.06	Satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.92	Satisfied
	IFI	≥ 0.90	IFI = 0.92	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.90	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.72	Satisfied

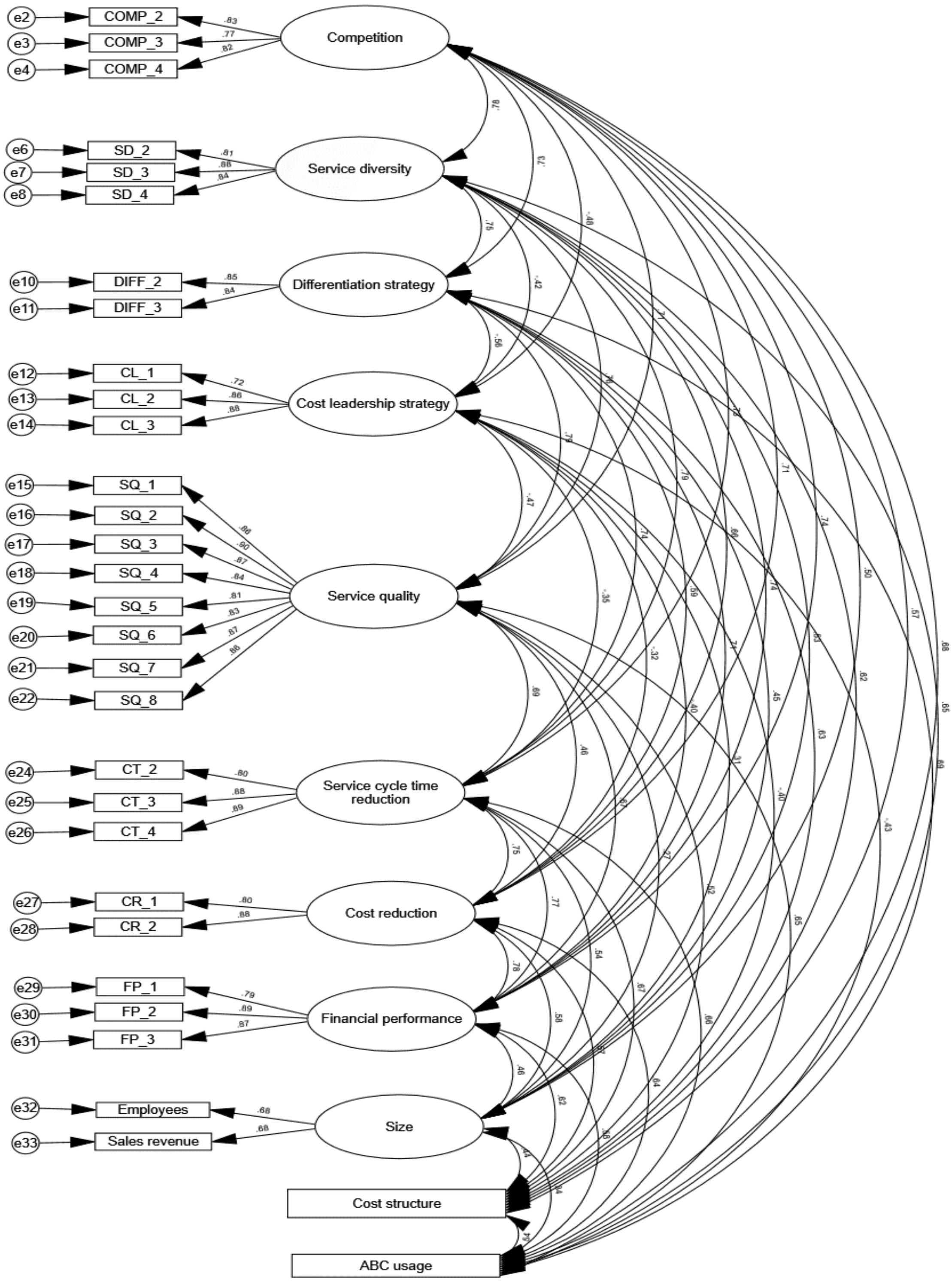
Appendix 8.4.4: Modification indices for the ABC usage measurement model

			M.I.	Par Change				M.I.	Par Change
e5	<-->	Service quality	23.73	-0.10	e5	<-->	Competition	5.62	0.06
e6	<-->	e5	22.00	0.13	e18	<-->	e23	5.57	0.06
e7	<-->	e10	18.57	-0.13	e23	<-->	ABC usage	5.56	-0.10
e8	<-->	e7	17.92	0.12	e7	<-->	e26	5.56	-0.06
e11	<-->	e13	17.48	-0.15	e9	<-->	Competition	5.48	0.06
e1	<-->	Service quality	15.99	0.09	e10	<-->	e27	5.46	-0.08
e1	<-->	e9	15.83	0.14	e3	<-->	e19	5.44	0.08
e21	<-->	e20	14.34	0.09	e13	<-->	Service quality	5.39	0.05
e5	<-->	e10	13.44	0.12	e11	<-->	e20	5.37	-0.08
e9	<-->	e13	11.90	0.11	e4	<-->	Service diversity	5.30	0.05
e26	<-->	e25	11.69	0.09	e28	<-->	e31	5.29	0.07
e7	<-->	Service quality	11.12	0.06	e12	<-->	Differentiation strategy	5.29	-0.06
e2	<-->	e27	10.81	0.10	e3	<-->	e33	5.26	-0.06
e7	<-->	e5	10.73	-0.09	e12	<-->	e16	5.25	0.05
e9	<-->	e31	10.56	-0.10	e1	<-->	e5	5.20	-0.08
e19	<-->	e18	9.82	0.09	e2	<-->	e5	5.15	0.07
e1	<-->	e12	9.53	-0.11	e9	<-->	e20	5.13	0.07
e8	<-->	e5	9.47	-0.09	e5	<-->	Differentiation strategy	5.13	0.06
e11	<-->	e25	9.39	0.10	e1	<-->	e31	5.03	-0.07
e13	<-->	e26	9.37	-0.09	e5	<-->	e9	5.00	-0.07
e11	<-->	e27	9.35	0.11	e13	<-->	e31	4.93	-0.07
e17	<-->	e27	9.25	-0.08	e22	<-->	e21	4.91	0.05
e23	<-->	e24	8.84	0.08	e3	<-->	Size	4.84	-0.12
e8	<-->	e6	8.72	-0.08	e7	<-->	e9	4.70	0.06
e4	<-->	e1	8.71	-0.11	e21	<-->	e16	4.68	-0.04
e1	<-->	e33	8.62	0.07	e4	<-->	Financial performance	4.67	0.05
e6	<-->	e23	8.57	0.08	e21	<-->	e26	4.63	-0.05
e5	<-->	e23	8.54	0.08	e11	<-->	e9	4.59	-0.08
e7	<-->	e21	8.36	0.07	e15	<-->	e28	4.54	-0.05
e9	<-->	e12	8.04	-0.09	e22	<-->	e28	4.51	0.06
e24	<-->	e30	7.77	0.08	e1	<-->	e13	4.49	0.07
e2	<-->	e25	7.72	-0.08	e4	<-->	e5	4.48	0.07
e16	<-->	e26	7.67	0.06	e26	<-->	Size	4.43	-0.10
e11	<-->	e14	7.62	0.11	e13	<-->	Cost reduction	4.40	-0.05
e23	<-->	Service diversity	7.59	0.05	e12	<-->	Financial performance	4.32	0.05
e1	<-->	e15	7.57	0.07	e10	<-->	e28	4.29	0.07
e14	<-->	Differentiation strategy	7.56	0.08	e17	<-->	e23	4.28	-0.05
e21	<-->	e19	7.36	-0.07	e6	<-->	e9	4.25	-0.06
e12	<-->	Service quality	7.26	-0.06	e8	<-->	e14	4.23	-0.07
e6	<-->	e10	6.77	0.08	e15	<-->	Size	4.18	0.08
e26	<-->	e23	6.43	-0.07	e23	<-->	Cost reduction	4.17	0.05
e7	<-->	Service cycle time	6.42	-0.04	e4	<-->	Cost structure	4.13	0.01
e11	<-->	e24	6.40	-0.09	e13	<-->	e32	4.04	-0.04
e9	<-->	Service quality	6.08	0.05					
e31	<-->	Cost reduction	5.91	0.06					
e1	<-->	e17	5.88	0.07					
e27	<-->	Size	5.84	0.12					
e23	<-->	e27	5.68	0.07					
e4	<-->	Service quality	5.64	-0.05					

Appendix 8.4.5: AVE, MSV, and ASV for the ABC usage measurement model

Latent constructs	AVE	MSV	ASV
1 Cost structure	1.00	0.46	0.32
2 ABC usage	1.00	0.48	0.36
3 Financial performance	0.72	0.61	0.43
4 Cost reduction	0.70	0.61	0.38
5 Service cycle time reduction	0.69	0.71	0.48
6 Service quality	0.74	0.71	0.40
7 Size	0.47	0.34	0.21
8 Cost leadership strategy	0.68	0.31	0.17
9 Differentiation strategy	0.69	0.71	0.45
10 Service diversity	0.67	0.71	0.49
11 Competition	0.64	0.65	0.47

Appendix 8.4.6: The CFA measurement model for the ABC usage after diagnostics



Appendix 8.4.7: The regression weight for the ABC usage measurement model after diagnostices

			Unstandardized regression weight	S.E.	C.R.	p	Standardised regression weight
COMP_2	<---	Competition	1.00				0.83
COMP_3	<---	Competition	0.94	0.08	12.13	0.00^*	0.77
COMP_4	<---	Competition	0.99	0.08	13.23	0.00^*	0.82
SD_2	<---	Service diversity	1.00				0.81
SD_3	<---	Service diversity	1.07	0.07	14.63	0.00^*	0.88
SD_4	<---	Service diversity	1.03	0.07	13.77	0.00^*	0.84
DIFF_2	<---	Differentiation strategy	1.00				0.85
DIFF_3	<---	Differentiation strategy	1.02	0.07	13.88	0.00^*	0.84
CL_1	<---	Cost leadership strategy	1.00				0.72
CL_2	<---	Cost leadership strategy	1.36	0.12	11.34	0.00^*	0.86
CL_3	<---	Cost leadership strategy	1.61	0.14	11.45	0.00^*	0.88
SQ_1	<---	Service quality	1.00				0.86
SQ_2	<---	Service quality	1.13	0.06	18.41	0.00^*	0.90
SQ_3	<---	Service quality	1.13	0.07	16.95	0.00^*	0.87
SQ_4	<---	Service quality	1.09	0.07	16.16	0.00^*	0.84
SQ_5	<---	Service quality	1.09	0.07	14.94	0.00^*	0.81
SQ_6	<---	Service quality	1.07	0.07	15.79	0.00^*	0.83
SQ_7	<---	Service quality	1.15	0.07	17.24	0.00^*	0.87
SQ_8	<---	Service quality	1.20	0.07	16.91	0.00^*	0.86
CT_2	<---	Service cycle time reduction	1.00				0.80
CT_3	<---	Service cycle time reduction	1.16	0.08	14.67	0.00^*	0.88
CT_4	<---	Service cycle time reduction	1.18	0.08	14.75	0.00^*	0.89
CR_1	<---	Cost reduction	1.00				0.80
CR_2	<---	Cost reduction	1.32	0.10	13.09	0.00^*	0.88
FP_1	<---	Financial performance	1.00				0.79
FP_2	<---	Financial performance	1.32	0.09	14.35	0.00^*	0.89
FP_3	<---	Financial performance	1.29	0.09	13.85	0.00^*	0.87
Employees	<---	Size	0.38	0.03	12.04	0.00^*	0.68
Sales revenue	<---	Size	0.38	0.03	12.04	0.00^*	0.68

* P value < 0.001 (two-tailed).

Appendix 8.4.8: CFA's fitness indices for the ABC usage measurement model after diagnostics

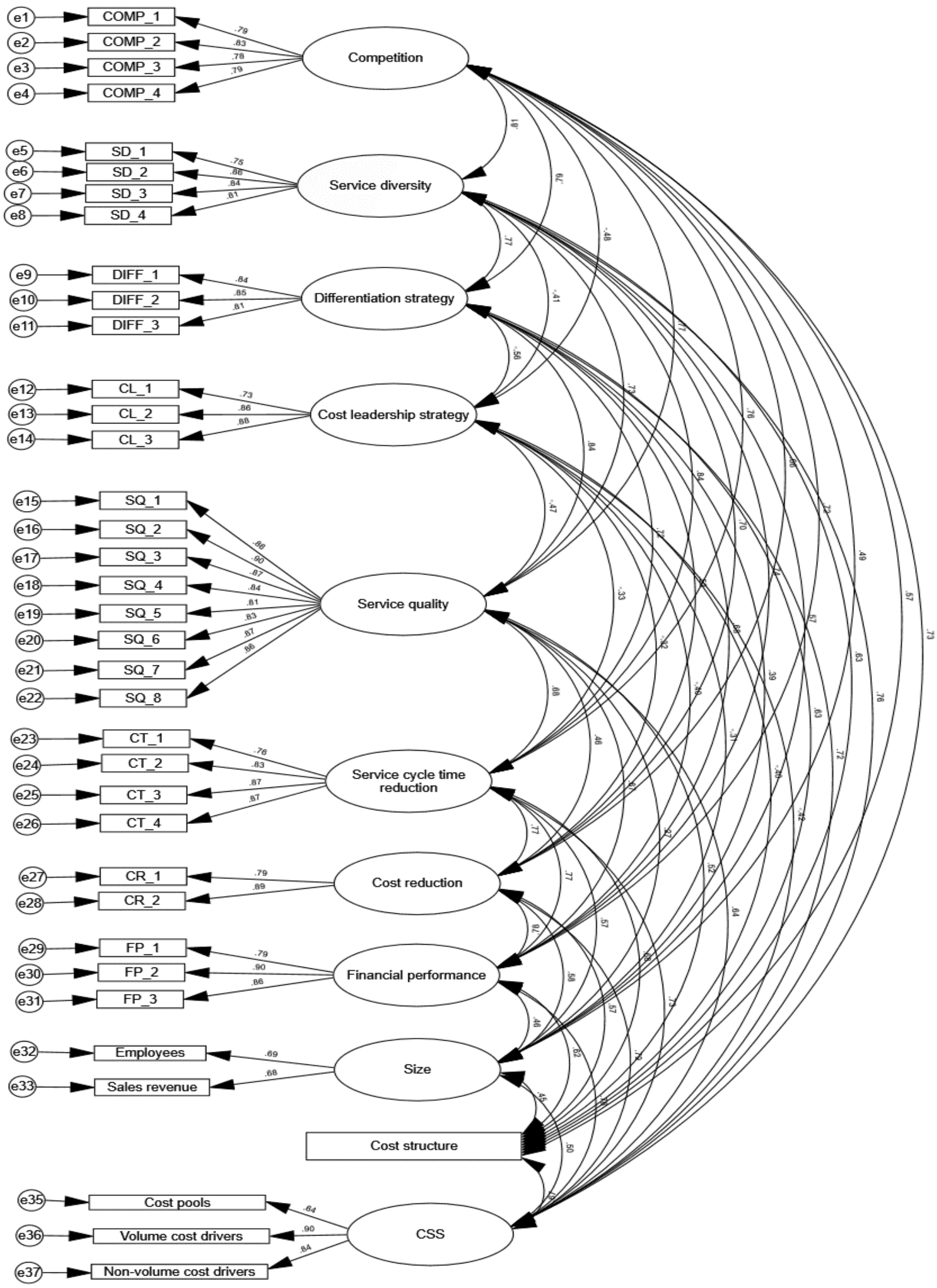
Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 661.733, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 1.73$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.06	Satisfied
	df	> 0	$df = 382$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.06	Satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.95	Satisfied
	IFI	≥ 0.90	IFI = 0.95	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.93	Satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.72	Satisfied

Appendix 8.4.9: AVE, MSV, and ASV for the ABC usage measurement model after diagnostics

Latent constructs	AVE	MSV	ASV
1 Cost structure	1.00	0.46	0.32
2 ABC usage	1.00	0.47	0.36
3 Financial performance	0.72	0.61	0.43
4 Cost reduction	0.70	0.61	0.39
5 Service cycle time reduction	0.74	0.63	0.47
6 Service quality	0.74	0.63	0.38
7 Size	0.47	0.34	0.20
8 Cost leadership strategy	0.68	0.32	0.18
9 Differentiation strategy	0.72	0.63	0.45
10 Service diversity	0.72	0.63	0.46
11 Competition	0.65	0.61	0.45

Appendix 8.5 The CSS measurement model

Appendix 8.5.1: The CFA measurement model for the CSS after factor loading consideration



Appendix 8.5.2: The regression weight for the CSS measurement model after factor loading consideration

			Unstandardized regression weight	S.E.	C.R.	*p*	Standardised regression weight
COMP_1	<---	Competition	1.00				0.79
COMP_2	<---	Competition	1.03	0.08	12.93	0.00*	0.83
COMP_3	<---	Competition	0.98	0.08	11.94	0.00*	0.78
COMP_4	<---	Competition	0.99	0.08	12.25	0.00*	0.79
SD_1	<---	Service diversity	1.00				0.75
SD_2	<---	Service diversity	1.28	0.10	12.66	0.00*	0.86
SD_3	<---	Service diversity	1.24	0.10	12.46	0.00*	0.84
SD_4	<---	Service diversity	1.20	0.10	11.93	0.00*	0.81
DIFF_1	<---	Differentiation strategy	1.00				0.84
DIFF_2	<---	Differentiation strategy	1.02	0.07	14.67	0.00*	0.85
DIFF_3	<---	Differentiation strategy	1.00	0.07	13.64	0.00*	0.81
CL_1	<---	Cost leadership strategy	1.00				0.73
CL_2	<---	Cost leadership strategy	1.35	0.12	11.37	0.00*	0.86
CL_3	<---	Cost leadership strategy	1.61	0.14	11.50	0.00*	0.88
SQ_1	<---	Service quality	1.00				0.86
SQ_2	<---	Service quality	1.13	0.06	18.47	0.00*	0.90
SQ_3	<---	Service quality	1.13	0.07	17.00	0.00*	0.87
SQ_4	<---	Service quality	1.09	0.07	16.15	0.00*	0.84
SQ_5	<---	Service quality	1.09	0.07	14.92	0.00*	0.81
SQ_6	<---	Service quality	1.07	0.07	15.83	0.00*	0.83
SQ_7	<---	Service quality	1.15	0.07	17.27	0.00*	0.87
SQ_8	<---	Service quality	1.20	0.07	16.93	0.00*	0.86
CT_1	<---	Service cycle time reduction	1.00				0.76
CT_2	<---	Service cycle time reduction	1.23	0.10	12.54	0.00*	0.83
CT_3	<---	Service cycle time reduction	1.36	0.10	13.28	0.00*	0.87
CT_4	<---	Service cycle time reduction	1.39	0.10	13.29	0.00*	0.87
CR_1	<---	Cost reduction	1.00				0.79
CR_2	<---	Cost reduction	1.35	0.10	13.22	0.00*	0.89
FP_1	<---	Financial performance	1.00				0.79
FP_2	<---	Financial performance	1.33	0.09	14.30	0.00*	0.90
FP_3	<---	Financial performance	1.29	0.09	13.73	0.00*	0.86
Employees	<---	Size	0.38	0.03	12.06	0.00*	0.69
Sales revenue	<---	Size	0.38	0.03	12.06	0.00*	0.68
Cost pools	<---	CSS	1.00				0.64
Volume cost drivers	<---	CSS	0.68	0.07	10.42	0.00*	0.90
Non-volume cost drivers	<---	CSS	0.60	0.06	9.98	0.00*	0.84

* *p* value < 0.001 (two-tailed).

Appendix 8.5.3.: CFA's fitness indices for the CSS measurement model

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 1219.71, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 2.09$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.07	Satisfied
	df	> 0	$df = 567$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.70	Not satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.90	Satisfied
	IFI	≥ 0.90	IFI = 0.90	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.89	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.72	Satisfied

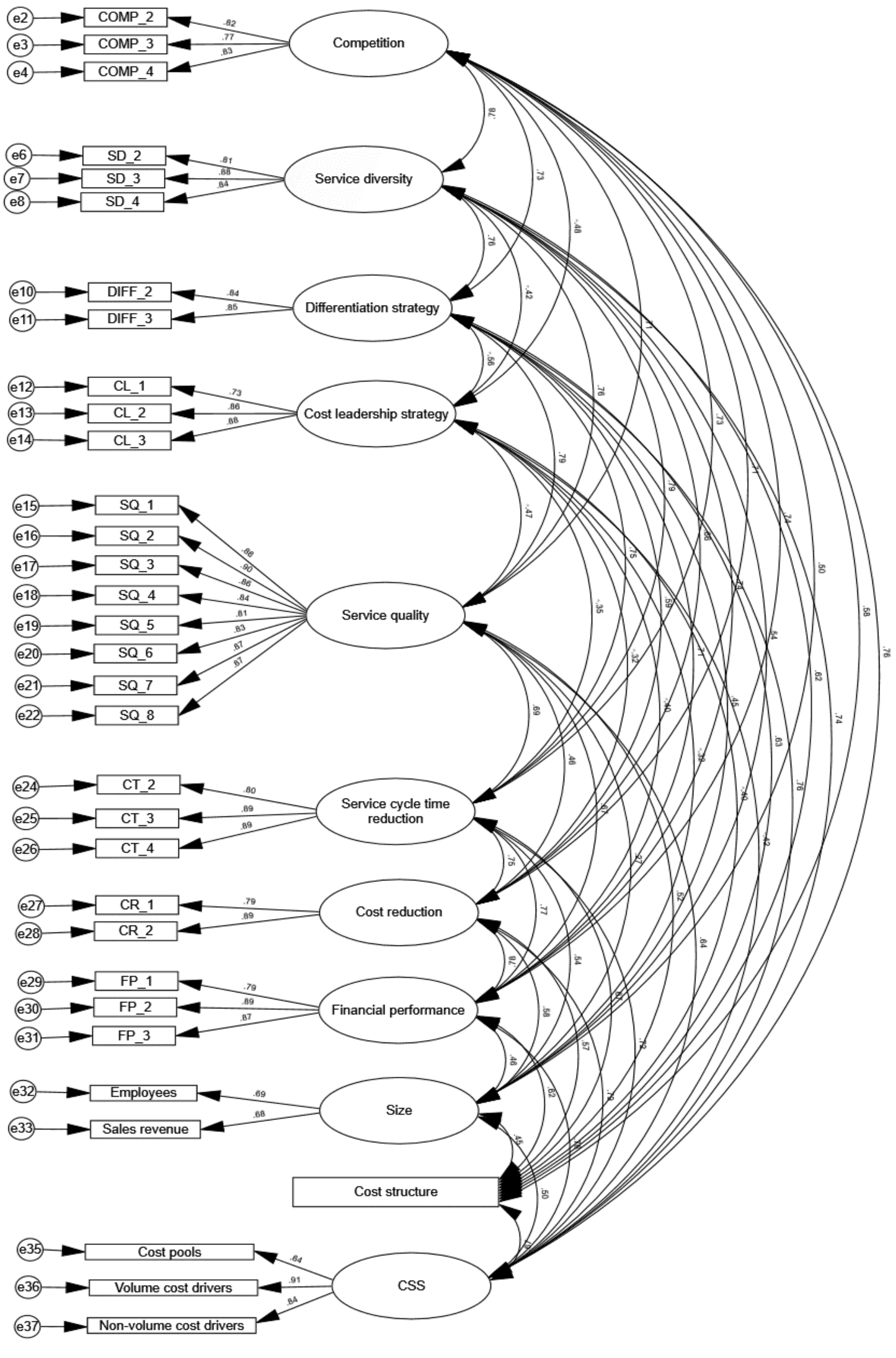
Appendix 8.5.4: Modification indices for the CSS measurement model

			M.I.	Par Change				M.I.	Par Change
e5	<-->	Service quality	23.39	-0.10	e13	<-->	Service quality	5.96	0.05
e6	<-->	e5	21.45	0.13	e6	<-->	e10	5.82	0.07
e35	<-->	Service quality	19.97	0.07	e5	<-->	Differentiation strategy	5.76	0.06
e8	<-->	e7	18.60	0.12	e12	<-->	Differentiation strategy	5.69	-0.06
e7	<-->	e10	17.69	-0.13	e36	<-->	Service diversity	5.67	-0.01
e11	<-->	e13	16.96	-0.15	e11	<-->	e20	5.67	-0.08
e1	<-->	e9	16.76	0.15	e36	<-->	Financial performance	5.58	0.01
e1	<-->	Service quality	16.02	0.09	e7	<-->	e26	5.57	-0.06
e21	<-->	e20	14.32	0.09	e18	<-->	e23	5.54	0.06
e5	<-->	e10	13.42	0.12	e3	<-->	e19	5.48	0.08
e7	<-->	e35	13.20	0.08	e3	<-->	e33	5.47	-0.06
e1	<-->	e36	13.07	-0.03	e28	<-->	e31	5.43	0.07
e7	<-->	Service quality	12.47	0.07	e12	<-->	e16	5.41	0.05
e15	<-->	e35	12.36	0.06	e10	<-->	e27	5.41	-0.08
e9	<-->	e13	12.19	0.11	e7	<-->	e9	5.37	0.07
e26	<-->	e25	12.07	0.09	e23	<-->	e27	5.36	0.07
e1	<-->	e35	12.05	0.09	e16	<-->	CSS	5.34	-0.02
e2	<-->	e27	11.66	0.11	e18	<-->	e37	5.28	0.02
e7	<-->	e5	10.25	-0.09	e2	<-->	e5	5.22	0.07
e11	<-->	e25	10.08	0.11	e19	<-->	CSS	5.21	0.03
e9	<-->	e31	10.05	-0.10	e9	<-->	e36	5.14	-0.02
e19	<-->	e18	9.89	0.09	e1	<-->	CSS	5.12	-0.03
e4	<-->	e1	9.67	-0.11	e9	<-->	e20	5.11	0.07
e13	<-->	e26	9.60	-0.09	e22	<-->	e28	5.09	0.07
e1	<-->	e12	9.48	-0.11	e3	<-->	Size	5.07	-0.13
e5	<-->	e35	9.37	-0.07	e26	<-->	e36	4.94	0.02
e8	<-->	e5	9.34	-0.09	e26	<-->	Size	4.91	-0.10
e8	<-->	e6	9.19	-0.08	e13	<-->	e31	4.89	-0.07
e12	<-->	e36	8.95	0.02	e21	<-->	e16	4.86	-0.04
e1	<-->	e33	8.89	0.07	e22	<-->	e21	4.84	0.05
e6	<-->	e23	8.66	0.08	e1	<-->	e5	4.84	-0.07
e5	<-->	e23	8.58	0.08	e13	<-->	e36	4.83	-0.02
e9	<-->	e12	8.51	-0.10	e4	<-->	Financial performance	4.80	0.05
e23	<-->	e24	8.50	0.08	e1	<-->	e13	4.79	0.07
e11	<-->	e27	8.33	0.10	e11	<-->	e9	4.74	-0.08
e17	<-->	e27	8.32	-0.08	e15	<-->	Size	4.71	0.08
e7	<-->	e21	8.25	0.07	e11	<-->	Competition	4.61	-0.06
e35	<-->	e37	8.23	-0.02	e5	<-->	e9	4.52	-0.07
e15	<-->	e37	8.23	-0.02	e21	<-->	e26	4.47	-0.05
e36	<-->	Service quality	8.20	-0.02	e6	<-->	e9	4.47	-0.06
e4	<-->	Service quality	7.84	-0.06	e17	<-->	e23	4.40	-0.05
e11	<-->	e14	7.83	0.11	e4	<-->	e5	4.39	0.07
e23	<-->	Service diversity	7.81	0.05	e1	<-->	e31	4.33	-0.07
e14	<-->	Differentiation strategy	7.56	0.08	e26	<-->	e35	4.23	-0.05
e1	<-->	e15	7.48	0.07	e5	<-->	e27	4.22	0.06
e16	<-->	e26	7.33	0.06	e8	<-->	e14	4.20	-0.07
e24	<-->	e30	7.32	0.07	e37	<-->	Service diversity	4.17	0.01
e21	<-->	e19	7.31	-0.07	e13	<-->	e32	4.16	-0.04
e9	<-->	Service quality	7.27	0.06	e12	<-->	e26	4.15	0.06
e12	<-->	Service quality	7.21	-0.06	e15	<-->	e28	4.13	-0.05
e2	<-->	e25	7.09	-0.08	e32	<-->	e27	4.13	0.04
e13	<-->	e35	7.05	0.06	e4	<-->	Service diversity	4.10	0.04
e26	<-->	e23	6.76	-0.07	e24	<-->	Differentiation strategy	4.07	-0.05
e7	<-->	e36	6.59	-0.02	e18	<-->	Service cycle time	4.07	0.03
e11	<-->	e24	6.51	-0.09	e18	<-->	e35	4.05	-0.04
e31	<-->	Cost reduction	6.33	0.06	e10	<-->	e28	4.05	0.07
e9	<-->	Competition	6.28	0.07	e9	<-->	e35	4.04	0.05
e22	<-->	e36	6.23	-0.02	e13	<-->	Competition	4.03	0.05
e7	<-->	Service cycle time	6.21	-0.04	e12	<-->	CSS	4.02	0.03
e27	<-->	Size	6.13	0.12	e21	<-->	e35	4.00	0.04
e5	<-->	Competition	6.08	0.06					
e1	<-->	e17	6.07	0.07					
e12	<-->	e35	6.05	-0.06					

Appendix 8.5.5: AVE, MSV, and ASV for the CSS measurement model

Latent constructs	AVE	MSV	ASV
1 CSS	0.65	0.63	0.47
2 Cost structure	1.00	0.46	0.34
3 Financial performance	0.72	0.58	0.45
4 Cost reduction	0.71	0.63	0.40
5 Service cycle time reduction	0.69	0.71	0.49
6 Service quality	0.74	0.71	0.40
7 Size	0.47	0.34	0.22
8 Cost leadership strategy	0.68	0.23	0.17
9 Differentiation strategy	0.69	0.71	0.46
10 Service diversity	0.67	0.71	0.50
11 Competition	0.64	0.65	0.47

Appendix 8.5.6: The CFA measurement model for the CSS after diagnostics



Appendix 8.5.7: The regression weight for the CSS measurement model after diagnostices

			Unstandardized regression weight	S.E.	C.R.	p	Standardised regression weight
COMP_2	<---	Competition	1.00				0.82
COMP_3	<---	Competition	0.95	0.08	11.95	0.00*	0.77
COMP_4	<---	Competition	1.01	0.08	13.28	0.00*	0.83
SD_2	<---	Service diversity	1.00				0.81
SD_3	<---	Service diversity	1.07	0.07	14.66	0.00*	0.88
SD_4	<---	Service diversity	1.03	0.07	13.82	0.00*	0.84
DIFF_2	<---	Differentiation strategy	1.00				0.84
DIFF_3	<---	Differentiation strategy	1.03	0.07	13.96	0.00*	0.85
CL_1	<---	Cost leadership strategy	1.00				0.73
CL_2	<---	Cost leadership strategy	1.36	0.12	11.35	0.00*	0.86
CL_3	<---	Cost leadership strategy	1.61	0.14	11.45	0.00*	0.88
SQ_1	<---	Service quality	1.00				0.86
SQ_2	<---	Service quality	1.13	0.06	18.46	0.00*	0.90
SQ_3	<---	Service quality	1.13	0.07	16.92	0.00*	0.86
SQ_4	<---	Service quality	1.09	0.07	16.18	0.00*	0.84
SQ_5	<---	Service quality	1.09	0.07	14.93	0.00*	0.81
SQ_6	<---	Service quality	1.07	0.07	15.80	0.00*	0.83
SQ_7	<---	Service quality	1.15	0.07	17.26	0.00*	0.87
SQ_8	<---	Service quality	1.20	0.07	16.93	0.00*	0.87
CT_2	<---	Service cycle time reduction	1.00				0.80
CT_3	<---	Service cycle time reduction	1.16	0.08	14.67	0.00*	0.89
CT_4	<---	Service cycle time reduction	1.18	0.08	14.70	0.00*	0.89
CR_1	<---	Cost reduction	1.00				0.79
CR_2	<---	Cost reduction	1.35	0.10	13.12	0.00*	0.89
FP_1	<---	Financial performance	1.00				0.79
FP_2	<---	Financial performance	1.33	0.09	14.31	0.00*	0.89
FP_3	<---	Financial performance	1.29	0.09	13.76	0.00*	0.87
Employees	<---	Size	0.38	0.03	12.07	0.00*	0.69
Sales revenue	<---	Size	0.38	0.03	12.07	0.00*	0.68
Cost pools	<---	CSS	1.00				0.64
Volume cost drivers	<---	CSS	0.68	0.07	10.46	0.00*	0.91
Non-volume cost drivers	<---	CSS	0.59	0.06	9.98	0.00*	0.84

* p value < 0.001 (two-tailed).

Appendix 8.5.8: CFA's fitness indices for the CSS measurement model after diagnostics

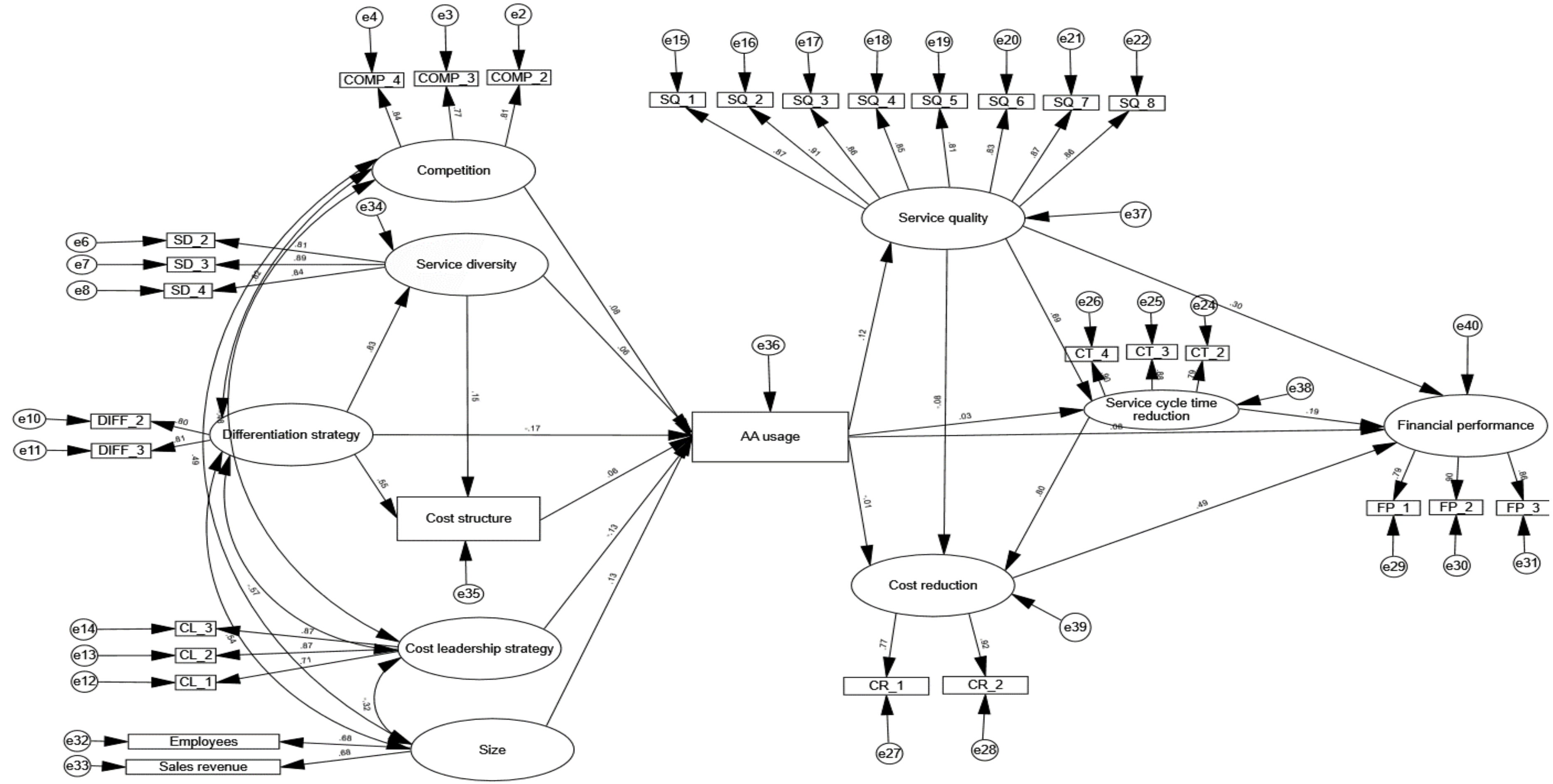
Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 753.334$, $p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 1.70$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.06	Satisfied
	df	> 0	$df = 442$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.61	Not satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.94	Satisfied
	IFI	≥ 0.90	IFI = 0.95	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.93	Satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.73	Satisfied

Appendix 8.5.9: AVE, MSV, and ASV for the CSS measurement model after diagnostics

Latent constructs	AVE	MSV	ASV
1 CSS	0.65	0.58	0.39
2 Cost structure	1.00	0.46	0.33
3 Financial performance	0.72	0.61	0.45
4 Cost reduction	0.71	0.61	0.40
5 Service cycle time reduction	0.74	0.63	0.47
6 Service quality	0.74	0.63	0.37
7 Size	0.47	0.33	0.22
8 Cost leadership strategy	0.68	0.31	0.17
9 Differentiation strategy	0.72	0.63	0.45
10 Service diversity	0.72	0.63	0.46
11 Competition	0.65	0.61	0.45

Appendices 9: The structural model findings for AM usage

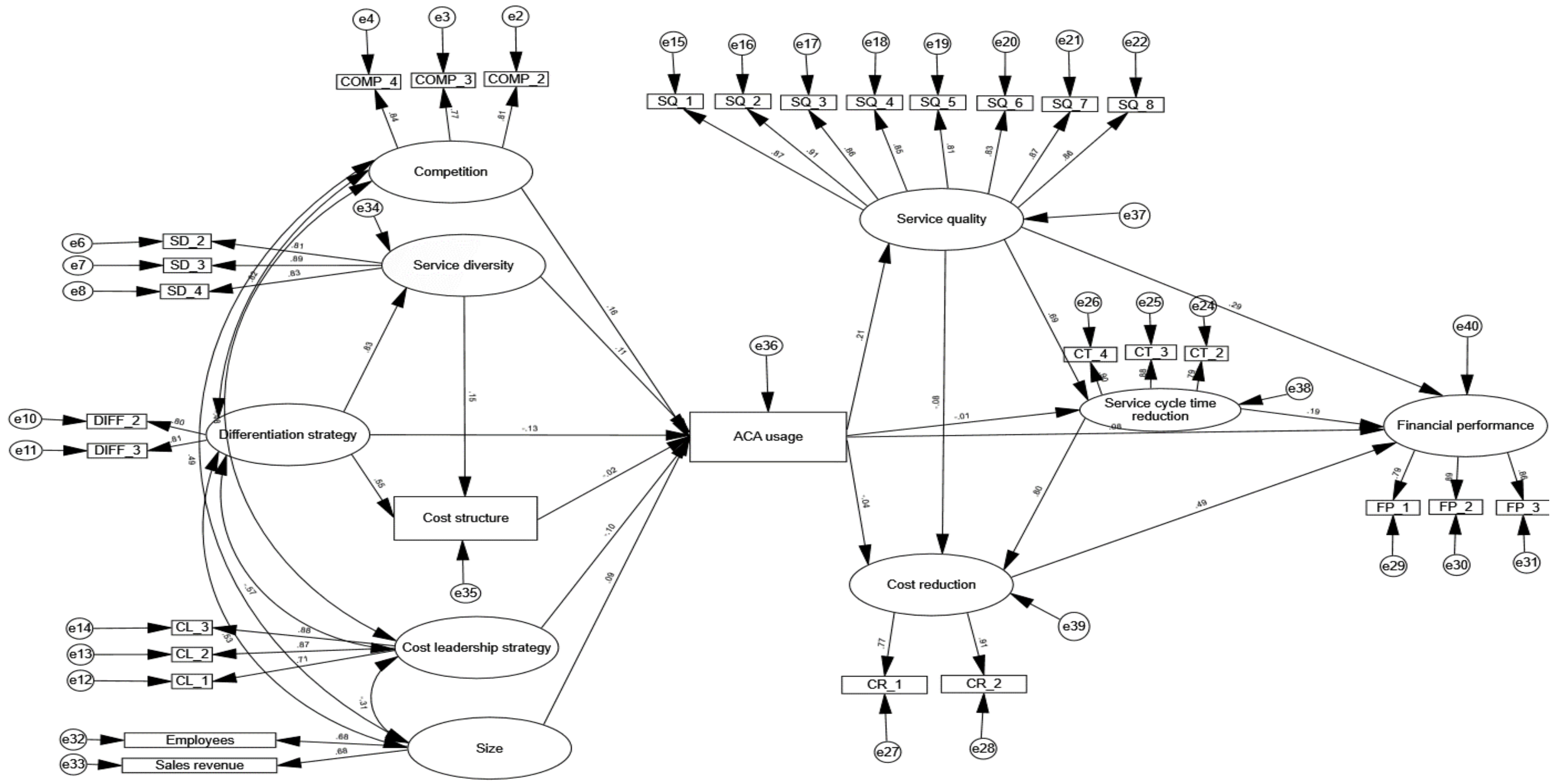
Appendix 9.1: The structural model for AA usage



Appendix 9.2: Fitness indices for the AA usage structural model

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 1043.561, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 2.53$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.09	Not satisfied
	df	> 0	$df = 412$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.30	Not satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.87	Not satisfied
	IFI	≥ 0.90	IFI = 0.87	Not satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.86	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.71	Satisfied

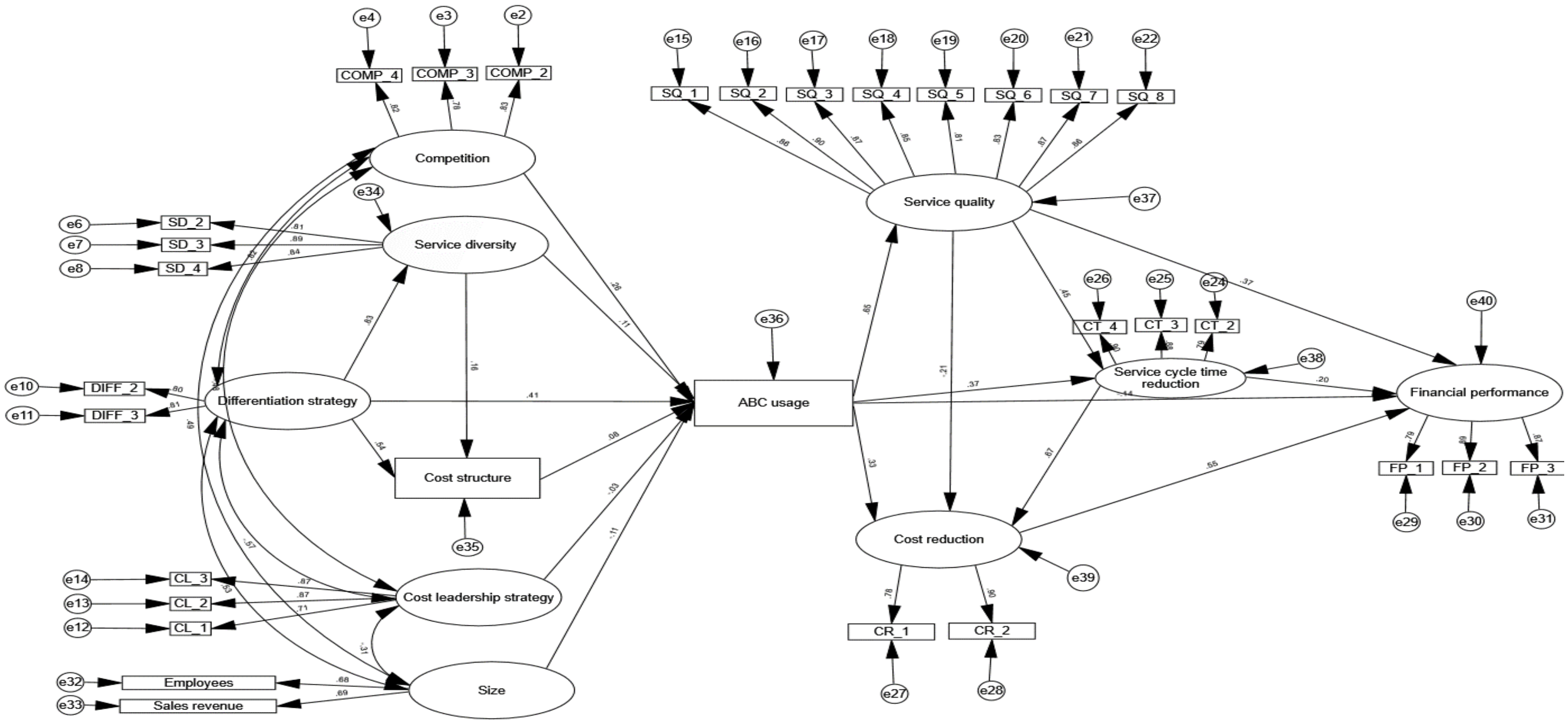
Appendix 9.3: The structural model for ACA usage



Appendix 9.4: Fitness indices for the ACA usage structural model

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 1049.721, p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 2.55$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.09	Not satisfied
	df	> 0	$df = 412$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.29	Not satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.87	Not satisfied
	IFI	≥ 0.90	IFI = 0.87	Not satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.85	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.71	Satisfied

Appendix 9.5: The structural model for ABC usage



Appendix 9.6: Fitness indices for the ABC usage structural model

Fitness indices		Requirement	Fitness indices values	Results
Absolute fit indices	χ^2	$p \geq 0.05$	$\chi^2 = 915.306$, $p \leq 0.00$	Not satisfied
	χ^2/df	≤ 3.0	$\chi^2/df = 2.22$	Satisfied
	RMSEA	≤ 0.08	RMSEA= 0.09	Not satisfied
	df	> 0	$df = 412$	Satisfied
	SRMR	≤ 0.08	SRMR = 0.14	Not satisfied
Incremental fit indices	CFI	≥ 0.90	CFI = 0.90	Satisfied
	IFI	≥ 0.90	IFI = 0.90	Satisfied
	TLI or NNFI	> 0.90	TLI or NNFI = 0.89	Not satisfied
Parsimony fit indices	PNFI	≥ 0.50	PNFI = 0.74	Satisfied

Appendices 10: Descriptive statistics for CSS

Appendix 10.1: A composite measurement of CSS

		Number of cost drivers																	
		0		1		2		3		4		5		6		7-10		>10	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Number of cost pools	0 (N= 63)	63	(30.88%)[1]																
	1 (N=9)	2	(0.98%)[1]	7	(3.43%)[2]														
	2-3 (N=9)	2	(0.98%)[1]	7	(3.43%)[3]														
	4-5 (N=6)	3	(1.47%)[1]	2	(0.98%)[4]					**1**	**(0.49%)7**								
	6-10 (N=24)	8	(3.92%)[1]	12	(5.88%)[5]	**2**	**(0.98%)[6]**							**1**	**(0.49%)[10]**	**1**	**(0.49%)[11]**		
	11-20 (N=40)	7	(3.43%)[1]	16	(7.84%)[6]	2	(0.98%)[7]	**1**	**(0.49%)[8]**	**1**	**(0.49%)[9]**	**2**	**(0.98%)[10]**	**1**	**(0.49%)[11]**	**10**	**(4.90%)[12]**		
	21-30 (N=14)	3	(1.47%)[1]	8	(3.92%)[7]											**2**	**(0.98%)[13]**	**1**	**(0.49%)[14]**
	31-50 (N=22)	5	(2.45%)[1]	4	(1.96%)[8]	1	(0.49%)[9]									**3**	**(1.47%)[14]**	**9**	**(4.41%)[15]**
	>50 (N=17)	7	(3.43%)[1]	1	(0.49%)[9]									1	(0.49%)[14]			**8**	**(3.92%)[16]**
Total (n = 204)		100	49.02%	57	27.94%	5	2.45%	1	0.49%	2	0.98%	2	0.98%	3	1.47%	16	7.84%	18	8.82%

Appendix 10.2: Transformed CSS indicators by using Log N

	Mean	Median	Std. Deviation
A5. Cost pools[a]	0.83	0.97	0.66
A6. Cost drivers[a]	0.30	0.30	0.40
A7. Volume cost drivers[a]	0.25	0.00	0.32
A8. Non-volume cost drivers[a]	0.15	0.00	0.30
[a] This is based on all respondents (i.e. including those using VCSs), no = 204 companies.			