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A Contingency View of Consolidation Systems

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Abstract

A consolidation system is a type of an accounting information system that aims to facilitate the consolidation process of organisations that are comprised of a collection of entities, but that are required to produce one set of consolidated financial statements. Contingency theory postulates that organisational sub-systems should be designed in accordance with the contextual variables and that performance will result if a match is achieved between these contextual variables and the characteristics of the sub-systems.

The aim of this research is to explain variations in the performance of the consolidation system of listed companies in terms of the relationships between a contingency variable and the characteristics of the consolidation system. The contingency variable that was used by this research is the extent of company decentralisation, while the characteristics of the consolidation system are integration; formalisation; and sophistication. The performance of the consolidation system has been measured by means of the number of accountant days that are required to complete the consolidation at the financial year-end.

The quantitative data was collected by means of self-completion questionnaires. Four hypotheses were assessed by means of Pearson correlation coefficients and a research model was evaluated by means of a structural equation model. The qualitative data collected by means of semi-structured interviews provided a more in-depth view of the manner in which consolidation systems are used at an organisational level.

It was shown that organisational decentralisation is positively related to consolidation system integration, sophistication and formalisation. It is contended that the findings of this research provide some support for contingency theory's central tenet of no universally appropriate consolidation system. The structural equation model that was developed fits the quantitative data very well, but the results were not entirely consistent with theoretical expectations, with only the system integration shown to influence the resources that are required to complete the year-end consolidation. This research extended contingency theory to this relatively new type of system and provided practitioners with evidence regarding the type of consolidation system that is appropriate to different organisations.

Table of Contents

List of Appendices

	Title	Page
A	Self Completion Questionnaire	206
B	Semi-Structured Interview Information	222
C	Semi-Structured Interview Analysis Table	240
D	Letters of Endorsement	275
E	Participant Research Results Report	277
F	Published Article	296
G	Public Lecture Information	303
H	Data Analysis Tables	306

Declaration

I confirm that no part of the material offered has previously been submitted by me for a degree in this or in any other University. If material has been generated through joint work, my independent contribution has been clearly indicated. In all other cases material from the work of others has been acknowledged and quotations and paraphrases suitability indicated.

Statement of Copyright

The copyright of this thesis rests with the author. No quotation from it should be published without their prior written consent and information derived from it should be acknowledged.

Acknowledgements and Dedication

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I owe a debt of gratitude to my mother, Lenca Smith, who encouraged me to embark on this long journey. Her belief in my ability to complete this degree and her constant encouragement was of endless worth.

I dedicate this dissertation to my loving wife, Andrea, and two wonderful children, Laurie and Reuben. My wife was endlessly patient with me, not only in proof reading the first versions of my dissertation chapters, but more importantly, in her unwavering support. I am grateful to Laurie and Reuben who cheered me up and provided welcome distraction from the routine of completing the degree.

I owe my life to Jesus Christ, who gave me the ability to complete this degree.

Chapter 1:

Introduction

1.1 Introduction

In the preface to the book "Information Systems Implementation", Lucas, Ginzberg et al (1990) claim that the "interest in the problems of implementing information systems has grown during the last two decades. Today, firms see information technology as a way to provide a competitive edge as well as to develop traditional information systems; information technology is rapidly becoming a part of the organization's strategy." (p. vii). Two decades hence, it appears that the claim made by Lucas, Ginzberg et al should be revised to read: information technology *has become* part of the organisation's strategy. It has been accepted as received knowledge that information technology should not be considered just another function or cost centre within the organisation, but that it should be used in a strategic manner to enhance the competitive advantage of an organisation.

Lucas, Ginzberg et al argue that the design and implementation of information systems pose a significant challenge to organisations and that it will have a significant impact on the eventual success or failure of the system. Yet, despite countless academic and commercial research projects that have been conducted in this field, it appears that properly designed and implemented information systems that meet the needs of the organisation remains elusive. Regrettably, the advice offered to organisations wanting to design and implement a new information system is often of a generic nature, failing to consider the organisation's distinctive characteristics and circumstances. The reality of today's complex and dynamic business environment is that the exact nature of a solution should be unique to the particular circumstances faced by that organisation. One single best solution that could be applied to all organisations in all circumstances simply does not exist.

This principle certainly applies to the field of Accounting Information Systems (AIS) where the single most desirable way in which financial data should be collected, processed and reported plainly does not exist. In this respect, the contingency theory of

AIS seems to be particularly relevant. The term contingency means that something is true only under specific conditions. A contingency approach to the design of AIS advocates the consideration of environmental, organisational and internal user characteristics of each company. Contingency theory assumes that the same AIS cannot meet all the needs of all companies equally well.

A consolidation system is a type of an AIS that has specifically been developed to facilitate the consolidation process of organisations that consist of a collection of entities, but that are required to produce one set of consolidated financial statements. A wide range of consolidation systems have emerged in recent years, ranging from spreadsheet based solutions, to applications designed exclusively for the consolidation function. It appears that such specialised applications are increasingly popular with large organisations, particularly with listed companies that are compelled by regulators to improve the internal controls over accounting processes and to produce the financial results soon after the financial year-end. High profile corporate failures, such as Enron in the United States, have resulted in notable changes to corporate governance and accounting standards (Eaton 2005). One of the findings from subsequent investigations into the causes of the dramatic collapse of Enron was that accounting rules were manipulated or blatantly disregarded during the consolidation process, particularly in relation to the consolidation of special purpose entities (SPE's) (Catanach and Rhoades 2003). This abuse of the consolidation process in order to purposefully misrepresent the financial statements has contributed towards renewed interest by various stakeholders into the accounting systems that are used during the consolidation process.

Research Objectives

The consolidation process is an integral part of the year-end process of any organisation that consists of more than one legal entity, which would include virtually all large companies. This process has to be performed on a type of accounting system, whether it is a spreadsheet, General Ledger, ERP system, or a specialised application. It is

remarkable that no published research could be found that specifically investigates the systems on which this important part of the year-end process is performed.

The principal objective of this research is to obtain an improved understanding of consolidation systems by means of a systematic enquiry of the design and use of these systems by companies that are listed on the Johannesburg Stock Exchange (South Africa). It will aim to determine whether contingency theory could be applied to consolidation systems and, if so, which contingency factors are most likely to influence the design and use of consolidation systems. The research will also endeavor to establish whether a consolidation system that is well suited to the needs of the organisation could enable the consolidation process to be completed with a reduced amount of resources. The systematic examination of consolidation systems will include not only the identification of the variables that would form part of a coherent research model, but importantly, will extend the investigation to an enquiry of the nature of the relationships between the variables.

Expected Contribution

Academic researchers often stand accused of lacking relevance to managerial practice and of too narrow a discipline base (Starkey and Madan 2001). This research attempted not only to meet the requirements of rigorous academic research, but also aspired to be relevant. Relevance implies that research should be valued by both academics and practitioners and should contribute towards an enhanced understanding of an issue. The lack of published academic research into consolidation systems per se, highlights the potential contribution of this research, which endeavored to make a worthwhile contribution to the field of accounting information systems by means of a systematic enquiry into consolidation systems. In this regard, this research could therefore be viewed as an enquiry into the validity of consolidation systems as a coherent empirical construct. From a theoretical point of view, the extension of the theoretical framework, that has widely been applied to management accounting systems, to consolidation

systems (being a type of financial accounting system), should also be considered meaningful contribution.

A natural consequence of a systematic enquiry into any particular subject would be an improved understanding of the elements of the subject; the nature of the relationships between these elements; and how the subject interacts with its environment. The benefits of such an enhanced understanding would be numerous in the context of consolidation systems, but one of the most significant would be an improved fit between the information requirements of the system users and the information delivered by the system. Such an improved fit is likely to contribute towards greater efficiency of the consolidated financial statements preparation process, which should enable accountants to focus more on value adding activities, such as meaningful analysis and interpretation of the financial information, as opposed to merely processing the financial data ('number crunching').

Software companies that develop accounting software often commission surveys that consider, amongst other aspects, the use of consolidation systems. These surveys are often very general and consider a broad range of issues relating to the use of accounting software. While the reports that are published on the basis of such surveys are interesting, analysis relating to consolidation systems in particular is often scant. Another shortcoming of such surveys is the actual or perceived independence and objectivity of the researchers: The organisations that conduct such surveys are paid by the software vendors and it is often the case that the results of the surveys are interpreted to provide support for the software solutions of the company that commissioned the research. From a practitioner perspective, it is expected that the research will provide much needed objective evidence regarding the manner in which consolidation systems are designed and used by organisations.

The internal control environment of organisations have received increased attention in recent years (refer to the next section), which resulted in the enhanced prominence of the internal controls that form part of the consolidation phase of the year-end process.

An improved understanding of the design and the actual use of consolidation systems is expected to contribute towards an internal control environment that is better suited to the needs of the organisation, which, in turn, should not only reduce the risk associated with the year-end process, but is also expected to contribute significantly towards some improvement in the reliability of the financial results.

1.2 Research Context

The completion of consolidated group financial statements is required by International Financial Reporting Standards (IFRS) for all reporting entities that involve business combinations. IFRS3 (2005) dictates that all business combinations should be consolidated according to the purchase method. This method specifies that an acquirer should measure the cost of a business combination as the aggregate of the fair values, at the date of exchange, of assets, given liabilities incurred or assumed, and equity instruments issued by the acquirer, in exchange for control of the acquiree. Applying this method is a complex process by which the results of subsidiaries, joint ventures and associate companies are adjusted and then combined into one set of consolidated financial statements of the parent company.

Until relatively recently, financial consolidations were commonly performed by means of spreadsheet applications. Spreadsheets were used either as the foundation of the consolidation processes or, at large companies, to supplement a consolidation process that is performed in the general ledger or ERP system. However, the current trend of large or complex groups of companies is to make use of specialised consolidation systems (Van Decker 2007). In a somewhat dated survey of a sample of organisations that publish consolidated financial statements, it was found that 54 per cent use specialised consolidation systems, 28 per cent use bespoke systems and 6 per cent each use ledgers or spreadsheets (Newing 1996). The article in which the results this survey were published unfortunately did not provide either any information regarding the size and the representativeness of the sample, or the profile of participating companies –

such as the group turnover or the number of subsidiaries contained in the group. Consequently, it would be imprudent to make definite inferences from the results of Newing's survey. Nevertheless, it appears that a variety of applications are available to facilitate the consolidation function and also that specialised consolidation applications are not uncommon. Seddon, Wong et al. (1992) claim that companies make use of custom-built accounting information systems during the early stages of a system's life cycle, but that in the later stages of the life cycle, once the most popular features have been established, a clear preference for packaged applications emerge. Newing (1996) also alludes to such a trend in relation to consolidation systems.

Consolidation systems are expensive to acquire, develop and install. The installation process typically involves considerable customisation – a function that is normally performed by consultants that specialise in the design and installation of this type of software. These applications are purchased or developed by companies on the basis of the perceived improvements that are expected to be made to the consolidation process. It is therefore critical that these applications are designed and installed in such a manner that the information processing requirements of the users are fulfilled. If the information requirements of the users and the information made available by the consolidation systems are not matched, the not insignificant investment in this type of software will be considered wasted.

Accounting information systems have traditionally been conceived as consisting of: a) financial accounting information systems which are used to generate information predominantly for external users and b) management accounting information systems which are used to generate information for internal users. Management accounting information systems broadly consist of management accounting systems and cost accounting systems (Figure 1.1).

Management accounting and financial accounting information systems have generally functioned as distinct systems, with different user groups (internal versus external) and management accountants and financial accountants operating these systems

7

respectively. The professional training provided to and qualifications obtained by these two groups of accountants have also been separate, thus reinforcing the differences between financial and management accountants.   However, in recent years, the differences between these two systems have become more blurred, particularly with the advent of Enterprise Resource Planning (ERP) systems such as SAP and Oracle. ERP systems often encompass, amongst others, both financial and management accounting information systems.

Figure 1.1: Traditional View of Accounting Information Systems

```
              ┌──────────────────┐
              │   Accounting     │
              │   Information    │
              │    Systems       │
              └──────────────────┘
                        │
          ┌─────────────┴─────────────┐
┌──────────────────┐         ┌──────────────────┐
│   Management     │         │    Financial     │
│   Accounting     │         │   Accounting     │
│   Information    │         │   Information    │
│    Systems       │         │    Systems       │
└──────────────────┘         └──────────────────┘
          │
   ┌──────┴──────┐
┌──────────────┐  ┌──────────────┐
│  Management  │  │     Cost     │
│  Accounting  │  │  Accounting  │
│   Systems    │  │   Systems    │
└──────────────┘  └──────────────┘
```
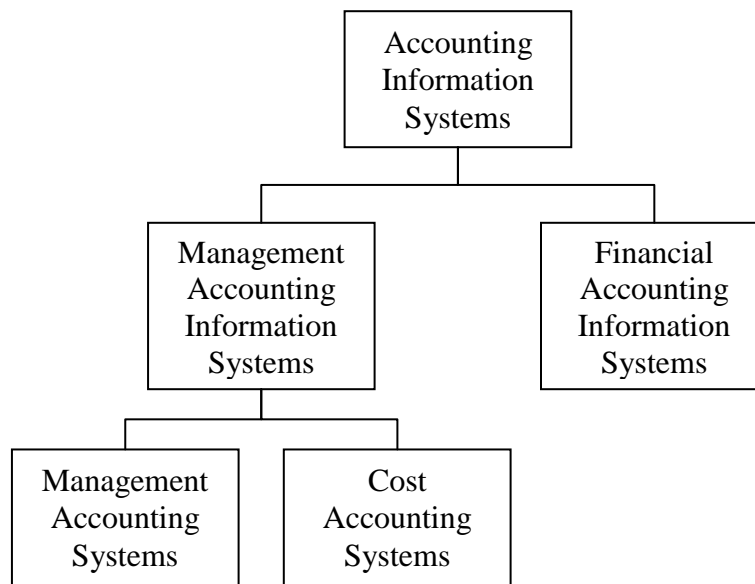
Consolidation systems are similar in that respect since they have the capacity to include data provided by both the financial and management accounting information systems. However, consolidation systems focus primarily on performing one function, namely consolidating financial information.   Consolidation systems are not a substitute for financial accounting information systems since it still requires these systems to perform the general ledger function.   Consolidation systems include elements of the financial accounting systems (actual data) and the management accounting systems (budgeting

and forecasting data), but they specifically do not include cost data. It is also not untypical for these systems to consolidate non-financial data such as the number of employees per geographical area or the average number of products sold per type of customer. Since consolidation systems include elements of the traditional financial and management accounting systems, it can be expected that certain similarities should exist between these two types of systems.

Regulatory Pressure

Stock exchange regulators demand the submission of quarterly and annual financial results in an increasingly shorter timeframe. The Securities and Exchange Commission (SEC), the stock exchange regulator in the USA, has reduced the period in which annual financial reports should be submitted from 90 to 60 days (Bragg 2005). A reduction in the period after which financial results should be published is a trend followed by regulators in other parts of the world. This trend has placed mounting pressure on listed companies that prepare consolidated financial information to perform what is commonly referred to in the industry as a 'fast close'. Fast close is a topical concept that refers to the rapid delivery of financial information to users. The faster closing of the financial records is also encouraged by the requirement of internal users of financial information to obtain rapid access to information on which to base decisions. Achieving a fast close of financial information does not necessarily mean that financial statements have to be published sooner. Such an achievement could allow management additional time to perform meaningful analysis of the results, thus improving their understanding of the financial information. A marked improvement in the relevance (being delivered soon after the event takes place) and reliability (free of material errors) of information is a possible source of competitive advantage for companies that operate in the fast changing global environment experienced in most industries. It is important to note that whereas a process that is able to perform a fast close requires more than only a properly designed and installed consolidation system, such a system is a fundamental part of the process. While it is certainly the case that the stakeholders of all companies would prefer financial information to be more

relevant, listed companies in particular are placed under considerable pressure to produce financial statements soon after the year-end. Certain stakeholders, specifically fund managers and the financial press, appear to cast doubt over the integrity of financial results when reporting occurs significantly after the industry average. Benchmarking studies are regularly commissioned in which performance of the year-end close process is compared to international and industry best practice. It is expected that this research will make a contribution towards improving the understanding of consolidation systems, thereby assisting the efforts made by companies to perform a fast close.

Recent governance reforms, such as the Sarbanes-Oxley Act in the United States (2002) (commonly referred to as Sarbox), the Basel II Capital Accord and the revised Combined Code (2003) in the UK, aimed to minimise the risk of future major corporate failures by means of tighter regulation of internal control systems (Woods 2009). The Sarbanes-Oxley Act is a controversial law enacted by the United States government in response to a number of major accounting scandals, most notably Enron and WorldCom. These and other similar scandals resulted in a marked decline of public trust in accounting and reporting practices. All companies that have a stock exchange listing on an American stock exchange have to comply with the Sarbox legislation, which, amongst other onerous obligations, requires formal management certification of the accuracy of the financial statements. This places additional pressure on managers to produce financial statements that are free from material errors since they will be held personally responsible if the act is contravened. Understandably, managers are keen to implement internal controls that will reduce the likelihood of financial information containing material errors. Consolidation systems, being a part of the internal control system of organisations, have therefore received additional attention in recent years in the attempts by managers to improve the reliability of the published financial information.

1.3 Terminology

The terminology used in this document will be clarified in this section. The explanations provided are not intended to serve as an exhaustive definition, but mainly as a guide to the readers.

- **Accounting Information System (AIS):** is a computer-based system that processes financial information and supports decision tasks in the context of coordination and control of organizational activities (Nicolaou 2000).

- **Close**: The controlled process whereby financial data is gathered, adjusted and reported in the form of management reports and financial statements. It was decided to use only the financial year-end as a measure of performance since this is the only event at which all entities will be forced to complete the entire set of financial statements and notes to the financial statements. The period to complete the financial *half year-end* was not used because some organisations could prepare a complete set of financial statements and notes to the financial statements, which is beyond regulatory requirements. A measurement based on the half year-end process could therefore have resulted in an inappropriate comparison.

- **Consolidation System**: The system that is used to consolidate the financial data of organisations into a set of consolidated financial statements and notes to the financial statements. The most popular configuration of such a system in large organisations is that of a distinct application used to facilitate the consolidation (Figure 1.2). This stand-alone consolidation *application* would normally form part of a consolidation *system*. The consolidation system would typically also include an ETL tool (refer to description below), database and a reporting application. However, it specifically excludes the general ledger. In such a configuration, the consolidation system would therefore be a collective

term for all the tools, applications and databases that facilitate the consolidation process (represented by a dotted line in figure 1.2). It is also the case that certain organisations make use of a module within the general ledger or the ERP system to perform the consolidation. In such instances, the distinct modules or features of these applications that facilitate the consolidation is referred to as the consolidation system, and would be examined as part of the research. Some companies would make use of spreadsheets to complete the consolidation. In such instances, spreadsheets would then be referred to as the consolidation system.

Figure 1.2: Consolidation System Architecture
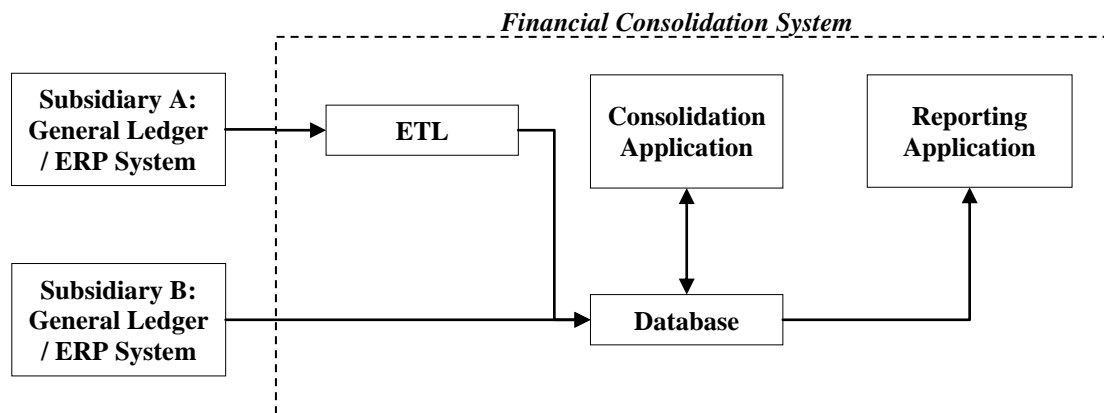
-   **ETL** (Extract, Transform, and Load): The processes, often used in a data warehousing environment, during which data from outside sources is extracted, transformed to fit a specific business need, and ultimately loaded into the target application or database. In the context of this research, the source of the financial data is commonly a general ledger or an ERP application, while the destination is the database that is used by the financial consolidation application. The transformation that takes place in a financial consolidation system is principally the conversion from one chart of accounts to the common chart of accounts used during the consolidation. Some validation of the data

12

loaded could also take place during the translation, but the majority of the validation normally takes place in the consolidation application.

- **Group Accountants:** The accountants that are employed at the corporate head-office who are responsible for the completion of the consolidated financial statements. This collection of accountants is sometimes simply referred to as 'group'.

- **South African Rand:** The official currency of the Republic of South Africa. Figures, such as company turnover, will be presented in this currency. Abbreviated as either "R" or "ZAR".

1.4 Thesis Structure

This thesis has been structured into seven chapters: Following the introductory chapter, Chapter 2 will explore the relevant literature that has been reviewed regarding the theoretical framework. The chapter will discuss some of the seminal contingency studies and include a review the critiques of contingency theory. Chapter 3 is an extension of the literature survey, but will aim to develop a number of arguments that will culminate with the expression of the hypotheses and a holistic research model that will be tested as part of the research. Chapter 4 will explain the research methodology that has been adopted by this research project. This chapter will commence by providing a philosophical perspective of the methodology, followed by a justification of the chosen methods and research design. The chapter will conclude with an examination of the ethical issues that have been considered during the research. Chapter 5 will provide an account of the quantitative analysis that has been performed and discusses the results of this analysis. This chapter starts with a discussion of the results obtained by means of the descriptive statistical analysis and then progresses to an examination of the inferential statistical analysis results. Chapter 6 will explain the results that have been obtained from the qualitative analysis of the interviews. Chapter

7 will conclude the dissertation with a discussion of the research findings and will attempt to provide some synthesis of the results that have been obtained by means of the different analytical methods. This chapter will also offer suggestions for further research. The main body of the dissertation will be followed by a number of appendices that will include supplementary information that is important to the understanding of the entire research project, but is not central to the main thesis.

Chapter 2: Literature Review

2.1 Introduction

Contingency-based research in the field of accounting information systems has a long tradition and the continuous stream of empirical articles signals the continued importance and vitality of this research area (Gerdin and Greve 2004). Contingency theory of accounting is the exact opposite of universal theories of accounting since it links the effects or the optimality of accounting systems to the environment and context in which such systems operate (Hartmann and Moers 1999; Ittner and Larcker 2001). The term contingency means that something is true or will take place only under certain specified conditions. Contingency theory is based on the notion that organisations have to adapt their systems and structures to be congruent with the various contingencies or circumstances of their external environment. It postulates that the effectiveness of the organisation in coping with the demands of its environment is contingent upon the different elements of its various sub-systems being designed in accordance with the demands of the environment with which they interact (Burrell and Morgan 1979). Szilagyi and Wallace (1980) claim that the contingency approach attempts to understand the interrelationships within and among organisational sub-systems as well as between the organizational system as an entity and its environments. Both descriptions of contingency theory suggest that organisations have a multivariate nature where more than one variable under different conditions has to be observed and analysed. One of the most appealing aspects of contingency theory is its emphasis on the notion that an organisation should be regarded as an open system that interacts with its environment: Not only does the organisation provide products and services to the environment, but crucially, and of central importance to the theory, the organisation is influenced by factors in its environment. Thus, the organisation and its sub-systems should be designed to be congruent with the relevant environmental factors.

Contingency theory was significantly developed in the field of organisational behaviour which was a reaction to the management thinking of the first half of the twentieth century, which in turn was preoccupied by the search for the 'one best way'. The

contingency approach to organisational structure argues that effective organisations adjust their structure in a manner that is consistent with certain contextual factors (Huczynski and Buchanan 2006). The contingency approach holds that organisations will be more effective when a match is achieved between the organisation's contextual factors (contingencies) and its corporate strategy and organisational structure.

The field of management accounting has adopted the contingency approach enthusiastically and has applied it actively to the design of management accounting systems. The contingency theory approach to management accounting systems has considerable intellectual appeal and offers the potential for explaining various features of the design and usage of management accounting systems (Otley 1980). The achievement of a fit, or a match, between the information requirements of an organisation and its information capacity is central to contingency theory in the field of management accounting. The information requirements of an organisation are influenced by many contextual factors (the contingency variables), while the information capacity of an organisation is determined by, amongst others, its management accounting information systems. It is proposed that organisational performance will result if the management accounting information system fits the contextual variables, in other words, if information needs are met by the management accounting information system.

Contingency-based research has a long tradition in the study of accounting systems and has in recent years maintained its popularity with studies that examine the common contingency variables – such as environment, technology, size, structure, strategy and national culture – in more contemporary settings (Chenhall 2003). For example, a number of recent studies have attempted to apply contingency theory to the ubiquitous Enterprise Resource Planning (ERP) system (Brown and Vessey 1999; Ifinedo 2007). The following section will examine the limited available literature regarding consolidation systems, after which contingency theory, its application and evident shortcomings will be reviewed.

2.2 Consolidation Systems Literature

The lack of published academic literature that deals specifically with consolidation systems is somewhat of a mystery, especially in the light of the recent regulatory changes, such as the Sarbanes-Oxley Act in the United States, which greatly enhances the importance of internal controls over the entire year-end process and consequently also adds to the relevance of consolidation systems. A systematic search of academic literature revealed a single rather dated academic article in which consolidation systems were specifically considered.

Sasso (1988) performed a comparative analysis of consolidation systems that were used by five large multi-national organisations in the United States. The only characteristic of the consolidations systems that were investigated relates to the system configuration. In the context of this article, the system configuration refers to whether the entire group consolidation is performed on a single system that is located at the corporate head office, or whether the consolidation function is shared amongst the group members, which gives rise to a distributed consolidation system where many consolidation functions are performed at the reporting entity level, resulting in a mere aggregation taking place at the corporate head office. Sasso (1988) goes to great lengths to explain the advantages and disadvantages of the different consolidation system configurations. What is of particular interest is that the advantages and disadvantages are explained in terms of demands placed on the data processing and data transfer requirements of the consolidation system. For example, one research participant's consolidation system configuration is regarded as being ideal since the amount of data that is transferred to the consolidation system located at the corporate head office is limited and also because the data processing requirements of the corporate consolidation system is much reduced. While the transfer and processing of data was evidently an important consideration in the 1980's, vast improvements in technology and telecommunications have rendered such considerations to be of little or no significance. This preoccupation with the data transfer and processing requirements of the consolidation system reduces

the relevance of this article to the current state of technological development. It is regrettable that no other benefits of the different types of consolidation system configurations, such as improved internal controls or a reduction in the time required to complete the consolidation, are discussed.

One aspect of the article that is of considerable interest is the characteristic of the organisation that is considered in order to determine whether the consolidation system configuration is appropriate: The only organisational characteristic that is discussed, at some length, is the number of "reporting units" that is included in the consolidation. Only one passing reference is made to the geographical spread of the five organisations examined in this article. The remainder of the article is devoted to justifying the advantages and disadvantages of the different system configurations in terms of the number of reporting entities contained in the consolidated organisation. The absence of a discussion of other organisational characteristics in order to justify the consolidation system configuration, is of considerable importance. This preoccupation with the number of reporting entities points to the perceived importance to the consolidation function of the actual number of entities that are contained in an organisation.

One other interesting facet of this publication relates to the indicators of consolidation system performance that is used to measure the appropriateness of certain system configurations. Two measures of performance are used: frequency of use and the estimated length of the consolidation cycle. Sasso (1988) argues that when the use of the consolidation system is at the discretion of the user, more frequent use points to a higher performing system. This measure of system performance is consistent with other studies in the field of management accounting systems (Lucas 1975; Ginzberg 1979). However, the appropriateness of this measure of performance in the context of consolidation systems is questionable: The critical part of the argument in favour of employing system use as a measure of performance is the notion of *discretionary* use. While the use of management accounting systems might contain a certain element of discretion, the lack of any other viable method of completing the consolidation outside of the consolidation system would render the use of the consolidation system virtually

obligatory. In other words, group accountants do not have any other viable means of completing the consolidation separate from their consolidation system and are therefore forced to employ the system in order to complete the consolidation for all 12 periods of the financial year. Due to the obligatory nature of consolidation system usage, the frequency of system use is judged not to be an appropriate measure of performance.

The second measure of consolidation system performance that is used in this article is the estimated length of the consolidation cycle. Sasso (1988) defines the length of the consolidation cycle as the period of time that starts at the end of the financial year, and is completed once the financial reports are available for internal users. In the context of consolidation systems, this measure of performance is judged to be more appropriate than frequency of system use. However, measuring consolidation systems performance by means of the estimated length of the consolidation cycle, as defined by Sasso (1988), does include some imperfections. The most notable deficiency with this measure of performance results from the definition of the consolidation cycle. While Sasso's (1988) definition of the consolidation cycle does include the period during which the actual consolidation is performed, it also includes the period of time that is required by the reporting entities to finalise their financial information on their own General Ledgers, prior to submitting this information to the consolidation system for consolidation. In other words, the consolidation cycle, as defined by Sasso (1988), includes a period of time during which the consolidation system is not used at all. Consequently, the inclusion of the time spent by the reporting entities to finalise their financial information on their own general ledgers, as part of the consolidation cycle, renders this measure of system performance less than ideal. It would have been preferable if the consolidation cycle was defined more restrictively by limiting it to that period of time that is spent to complete the actual consolidation only.

Due to the lack of academic articles that specifically considers consolidation systems, it was decided to include a review of relevant articles published by commercial analysts. It should be emphasised that a) such material is based on the opinion of the author and not on empirical research; b) these publications are not subjected to peer review; and c)

the independence and objectivity of the authors are open to doubt. As a result, such publications would not qualify as acceptable scientific knowledge from an epistemological point of view and should therefore be treated with a certain degree of caution. Nevertheless, the dearth of other relevant academic material effectively forces the researcher to make use of such material in order to provide a view of the discourse regarding the subject matter. Two relevant articles, produced by commercial analysts, could be found and are reviewed in the remaining portion of this section.

Van Decker (2007) presents a range of criteria that is suggested should be considered when a financial consolidation system is selected. It is argued that increases in regulatory requirements and the complexity of financial reporting necessitate sophisticated consolidation and financial reporting solutions. Van Decker (2007) reasons that spreadsheet based consolidation systems are clearly inadequate, principally because such solutions are unable to provide the necessary controls over the disparate processes that are critical to the financial year-end process. Repeated reference to the need for consolidation systems to enhance the internal controls over the consolidation process reveals the importance attached by the author to this function of the consolidation system.

Another important function of the consolidation system that is highlighted relates to its ability to facilitate the consolidation function, when the subsidiaries that constitute the group perform their general ledger function on a range of different types of applications. It is mentioned that in recent years, consolidation systems have been enhanced to improve the level of automated dataflow between the source applications and the consolidation system. The author claims that the ability of consolidation systems to effectively map the financial data stored on disparate systems, to one chart of accounts stored on the central consolidation system, improves the efficiency of and control over the consolidation process.

Van Decker (2007) continues to claim that sophisticated consolidation systems are able to greatly improve the financial management process, enhance the accuracy of financial

results and reduce costs significantly. This astounding claim is merely made in passing and no substantiating evidence is provided. Such unsupported claims place other assertions made in considerable doubt and diminishes the credibility of the article.

Rayner (2007) provides some guidelines regarding the circumstances under which general ledger applications would be appropriate to complete the consolidation function. It is suggested that the number of entities that are contained in the group; the complexity of the group structure; and the stability of the group structure should all be considered when a decision is made whether or not to use the general ledger application of the holding company in order to complete the consolidation. Rayner (2007) argues that a consolidation could be effectively completed on a general ledger of the holding company if the group is organised in a centralised manner, consisting of a small number of entities. Equally, a general ledger consolidation could also be viable if the group structure is not overly complex, in other words, if the group structure consists of a small number of levels or hierarchies. Conversely, if the group is decentralised and/or is structured in a complex manner, consisting of numerous hierarchies, a general ledger would be an unsuitable consolidation system. It is also argued that a general ledger would be unable to facilitate the consolidation of a group if the structure is subject to frequent changes, such as merger and acquisitions, even if such a group is organised in a relatively centralised and uncomplicated manner. Rayner (2007) is of the opinion that a specialised consolidation application would be able to automate many of the complex adjustments that are necessary to account for the changes in ownership, while a general ledger would rely entirely on manual adjustments to be processed by accountants.

Rayner (2007) mentions that cost is a consideration that influences many decisions regarding the type of consolidation system to acquire. The popularity of spreadsheets as a consolidation solution could be attributed to the low cost of such applications. Nevertheless, it is argued that, despite their relative low cost, spreadsheets should not be regarded as an acceptable consolidation system, primarily due to the lack of internal controls that typically function over process that rely on spreadsheets.

2.3 Seminal Contingency Studies

Many articles could claim to be of considerable importance to the development of contingency theory in the field of accounting information systems (AIS). These studies do not originate only from the field of management accounting, but principally from the field of organisational behaviour. The development of contingency theory in organisational behaviour gained significantly from a series of articles that emanated from the Aston School (Pugh and Hickson 1976; Pugh and Hinings 1976; Pugh and Payne 1977). In the context of this research, two articles in particular are considered to be especially influential in the development of contingency theory in AIS. These two articles are reviewed in this section.

2.3.1   Gordon and Miller (1976)

Gordon and Miller attempted to provide a framework for the analysis of AIS that considers the specific needs of the organisation. They adopted a contingency approach which considered environmental, organisational and managerial decision making variables. Several hypotheses were presented but no empirical research was performed to test the hypotheses. Reid and Smith (2000) argue that contemporary contingency theory aims to explore the contingencies that shape the design of the AIS in particular, while contingency theory that predates Gordon and Miller (1976) had a broader aim of explaining the form of the organisation in relation to the contingencies. Reid and Smith (2000) are of the opinion that Gordon and Miller (1976) contributed significantly towards the transition of contingency theory from the initial broader concept, to a more narrowly defined concept that concerns itself primarily with the design of AIS.

Gordon and Miller (1976) present a model with the environment; organisational characteristics; and the decision making style of management as the independent variables, and the characteristics of the AIS as dependent variables. Cogent arguments are presented that AIS should be designed in the light of the contextual variables of

each organisation. Gordon and Miller continue to argue that environmental, organisational, and decision style traits are not distributed randomly, but actually cluster together to form commonly occurring configurations. Three 'archetypical' firms were observed by Miller (1975) which represent the commonly occurring configurations of the contextual variables: adaptive; running blind and the stagnant bureaucracy. The model presented by the authors was clearly influential in the development of subsequent contingency studies in the field of AIS since it was widely adopted and developed, with variations of the model being tested empirically (Alum 1997; Reid and Smith 2000).

A number of shortcomings are clearly present in the paper. The most evident deficiency is the lack of arguments that attempt to justify the assumed link between the performance of the organisation to the fit of contingency variables with the AIS characteristics. A crucial part of this assumed link is the existence of a relationship between the performance of the AIS and the performance of the organisation as a whole. The omission of arguments that attempt to justify the assumed link somewhat detracts from the rigour of the general thesis of the article.

The three archetypical firms which are used to describe the common clustering of contextual variables also seem to be a rudimentary and somewhat dated view of the complex business environment currently experienced. The authors argue that contextual variables occur mainly in these three configurations, and by implication, that three types of accounting systems should meet the needs of most organisations. Such a view of contingency theory is referred to as the 'configuration' view of fit by Gerdin and Greve (2004), where it is argued that only a few states of fit between context and the characteristics of the system exist and that organisations have to make 'quantum jumps' from one state of fit to another. It appears that other authors concur with this clustering view proposed by Gordon and Miller: Child (1974b), and Luthans and Stewart (1977) present similar arguments that places the contingency approach between a universal approach and a situation-specific approach – or the It-All-Depends term used by Child (1974b). It is proposed that certain classes (groupings) of environments

exist that allow for some generalisations to be made. Nevertheless, notion that only three types of accounting systems are supposed to meet the information processing requirements of most organisations, appears to be simplistic.

2.3.2   Application of Gordon and Miller (1976)

Ouksel, Mihavics and Chalos (1997) investigated whether AIS could facilitate or impede organisational learning. They claim that organisational learning is potentially influenced by the extent to which the AIS facilitates or impedes the uniform distribution of information through an organisation. Central to organisational learning is the ability of the organisation to recognise patterns in the environment and to build shared mental models across individuals and divisions. It is their contention that the AIS can make an important contribution to this process. In this context, the impact of environmental contingencies on the characteristics of the AIS, expounded by Gordon and Miller (1976), becomes particularly relevant. Environmental heterogeneity, being one of the key dimensions of the environment according to Gordon and Miller (1976), is considered in some detail by Ouksel, Mihavics and Chalos (1997). They claim that as the environment becomes more heterogeneous, greater reliance is placed on the AIS to provide reliable information on which actions could be based, particularly when the organisation is structured in a hierarchical manner. Ouksel, Mihavics and Chalos (1997) reason that organisations that operate in a heterogeneous environment, facilitate organisational learning by a greater reliance on the AIS to process budgeting and forecasting information, an argument which is similar to one advanced by Gordon and Miller (1976).

Reid and Smith (2000) specifically considered the clustering view of contingencies, as proposed by Gordon and Miller (1976). Data was collected from a sample of Scottish micro-firms and analysed by means of statistical cluster analysis, in order to test the hypothesis that contingencies cluster to form three main configurations: adaptive; running blind; and stagnant. It was found that Gordon and Miller's (1976) depiction of

the three commonly occurring configurations is generally supported by the data obtained from these small firms.

Nicolaou (2000) conducted empirical research to test a model where the contingencies of organisational coordination and control affect the extent of integration in AIS. The results of the study indicate that a fit between these contingencies and the AIS design was a significant factor that explained variations in the perceived satisfaction of decision makers with the accuracy of information supplied by, and the monitoring effectiveness of the AIS. Nicolaou (2000) acknowledges the importance of the work done by Gordon and Miller (1976), particularly in relation to the different models of fit between organisational characteristics and the AIS. However, the author points out that although early works in the field of AIS, such as Gordon and Miller (1976), did provide some useful directions for further research, a specific link to the performance of the system was not made where fit was achieved. Nicolaou (2000) endeavours to use this research to contribute towards the body of literature where the link to the performance of the system is explicitly considered.

2.3.3   Waterhouse and Tiessen (1978)

Waterhouse and Tiessen (1978) established a model for the comparative analysis of organisations that enabled the authors to develop hypotheses regarding the existence of relationships between environmental and organisational variables on the one hand, and management accounting system variables on the other. The authors state that a management accounting system is a form of organisational control – the budgeting process being a prime example. It is argued that the structure of an organisation is significantly dependent upon its context, and that alternative structures create a need for different management control methods. The corollary is that a relationship exists between organisational context (independent variable) and characteristics of the management accounting system (dependent variable). It is argued that this relationship functions by means of the mediating variable of organisational structures. Reid and

Smith (2000) is of the opinion that Waterhouse and Tiessen (1978) should be regarded as influential because contingency theory in the context of AIS became noticeably more refined as a result of their publication. It is the suggestion by Waterhouse and Tiessen that organisational structure functions as a mediating variable, that sparked a move away from a rather crude conception of the relationship between organisational context and the characteristics of the management accounting system, towards a more sophisticated and refined view of the relationship.

The proposed model focuses on two contextual variables – technology and environment. Technology is conceptualised in terms of routineness or non-routineness. It is put forward that the environment consists of internal and external elements. The independent variables contained in the model developed by Waterhouse and Tiessen should be contrasted with the independent variables included in most other contingency models. For example, the models used by Gordon and Miller (1976) and Thomas (1991) include a separate 'organisational characteristics' variable. Waterhouse and Tiessen (1978) on the other hand do not regard organisational characteristics as a distinct independent variable, but as a mediating variable. It could be argued that certain elements of organisational characteristics are included in the 'internal environment' part of the environmental variable used by Waterhouse and Tiessen. However, it is still significant that they regard organisational structure as a mediating variable, in contrast to the standard independent variable used by other authors.

2.3.4 Application of Waterhouse and Tiessen (1978)

Jones (1986) used case studies to explore accounting systems because, it is argued, such a qualitative approach is more effective at uncovering the social and political issues that surround accounting systems. The categorisation of the contingency variables proposed by Waterhouse and Tiessen (1978) was used as the basis for the detailed analysis of the proposed relationships between contingency variables and eleven characteristics of the accounting system. Jones (1986) argues that the initial high

expectations placed on contingency theory were disappointed because of the ill-defined criteria for the measurement of the effectiveness of the accounting system.   However, the author does warn that contingency theory should not be expected to provide a complete design prescription, but that it is capable of providing significant insight into the design contingencies of an accounting system.

Chenhall (2003) is of the opinion that Waterhouse and Tiessen (1978), along with Otley (1980), contributed extensively towards the identification and categorisation of the key contingency variables in the context of management control systems. Chenhall (2003) considers the external environment to be the contextual variable on which contingency-based research is founded. An important contribution towards the development of the external environment as a fundamental contextual variable, was the analysis by Waterhouse and Tiessen (1978) of environment according to simple-complex and static-dynamic dimensions. Chenhall (2003) states that in the period that elapsed since the publication of Waterhouse and Tiessen (1978), a consistent stream of research agrees on the impact of the external environment on the design of the AIS, but it is regretted that little is known about the appropriate design of such systems in the presence of complex and conflicting forces.

Sharma (2002) performed a contingency study in the context of the service sector, where the influence of contextual variables on the characteristics of the budget system of hotels was investigated.   The notion that environmental unpredictability will influence the design of the management accounting system, as developed by Waterhouse and Tiessen (1978), was used extensively in the article and provided the basis of a number of hypotheses which were then tested.   The results indicated that perceived environmental unpredictability, the size and the structure of the organisation all have a significant effect on the budget system characteristics. However, it was found that no significant relationship exists between the size and the structure of the service organisation, which is contrary to conclusions reached by other studies conducted in the manufacturing sector (Burns and Waterhouse 1975; Merchant 1981).

2.4 Critiques of Contingency Theory

Contingency theory is considered to be a mature theory and has been subject to several critical reviews of its development and deficiencies (Chenhall 2003). Such reviews are largely negative, denouncing the research for being fragmentary and contradictory due to methodological limitations (Gerdin and Greve 2004), and also lacking an overall framework for the analysis of the relationship between contingent factors and accounting, leaving no obvious starting point for an explanation of an increasing body of often contradictory results (Chapman 1997). However, Fridman and Ostman (1989) point out that the concerns raised by many commentators in the field revolve around criticism of particular concepts of contingency as embodied in the studies reviewed, not with the idea of contingency theory per se.

In general, contingency theories of management accounting have been subject to the same criticisms as contingency theories of organisational structure (Tiessen and Waterhouse 1978). It is argued that: a) the nature of appropriate contingency variables has not been adequately clarified; b) their operationalisation has been problematic; c) links with organisational effectiveness are uncertain; and d) the question of the design of management accounting systems when faced with contingent variables that give conflicting recommendations has not been properly explored (Otley 1980).

Contingency theory is also criticised for its lack of clearly defined independent variables. The definitions of technology and the environment often vary considerably between studies. For example, Waterhouse and Tiessen (1978) include physical and social factors within the boundary of the organisation as part of the environmental variable. In contrast, the model proposed by Thomas (1991) considers the environment as the industry in which the company operates, and would regard internal physical and social factors to be part of the 'organisational attributes' variable.   In the model proposed by Thomas (1991), 'Societal Variables' are included as a new and distinct

classification of a range of contingency variables. The type of contingency variables considered by Thomas to form part of 'Societal Variables' would most certainly have been regarded as environmental variables in other models. These are important inconsistencies in the definitions used by contingency theory studies. Such inconsistencies inhibit the development of conceptual clarity and prevent straightforward comparisons to be made between research that makes use of the contingency approach as a theoretical framework.

One of the most damning criticisms directed towards the theory is that the contingency variables chosen in any one study account for only a small percentage of the variation in organisational performance. Weill and Olson (1989) attribute the small percentage of the variation in performance to the questionable assumption of a positive link between the information system and organisational performance. The authors noted that even if it could be argued that an effective management information system would lead to improved organisational performance, it remains that the performance of the organisation is subject to numerous moderating variables that could swamp the beneficial effect of an effective management information system. In addition, it is argued that certain measures of organisational performance are liable to gross manipulation by managers – in particular financial measures – and could therefore misrepresent actual performance. Waterhouse and Tiessen (1978) raise a similar criticism by claiming that contingency research fails to present convincing evidence that a link exists between contextual factors that match the characteristics of accounting information systems, and the performance of the organisation. They continue to note that some studies, such as Child (1973), used questionable measures of performance and drew inferences from small sample sizes. The concern of contingency theory with the performance of the organisation should be contrasted with the congruence approach proposed by Drazin and Van de Ven (1985), who assumes that only the best performing organisations survive and can therefore be observed. The performance of the organisation is therefore ignored because it is assumed that a form of natural selection occurs where organisations that did not achieve a fit with their contextual variables will fail to perform and consequently cease to exist in the long term.

Weill and Olson (1989) also criticise contingency theory for being deterministic, which causes much of the richness and complexity of the social sciences to be ignored. In this context, determinism refers to the proposition that there is no room for explanations based on reciprocal relationships among variables (Markus and Robey 1988). A strictly deterministic argument would claim that exactly one physically possible future could be possible at any instant. Such an argument is based on the assumption that managers would make rational, non-political decisions based on accurate and abundant information. Contingency theory assumes that people are rational actors that perform in ways which are always in concert with the goal of organisational effectiveness (Weill and Olson 1989). It is therefore assumed that managers act rationally with the intention to adapt the systems for which they are responsible to changes in the contingencies, in order to attain fit and enhanced performance. This assumption might be necessary for the theory to be conceptually sound, but in reality it is clearly an unrealistic assumption. Casting further doubt on the assumption of rational, non-political decision-makers, Markus (1983) found evidence of the influence of political considerations on the design and implementation of management information systems. She argued that under certain circumstances, political considerations resulted in the failure of rational management objectives to be translated into features of the system. The failure of people to always act in a rational manner could be one of the factors that contribute towards the criticism that the contingency variables normally chosen account for only a small percentage of the variance in organisational performance. The deterministic assumption used by some contingency studies are questionable, particularly in the light of the work done by Hofstedt and Kinard (1970), who presented evidence that accounting information systems influence the decision making behaviour of managers, instead of the standard causal direction that is normally examined where user characteristics influence the accounting information system.

Longenecker and Pringle (1978) criticized contingency theory in general by claiming that many studies that adopt this theoretical framework, often conclude with a listing and basic classification of variables. These authors argue that of much greater value

would be an investigation into the nature of the relationship between the stated variables. Child (1996) advances a similar criticism because of the tendency of contingency studies to find significant statistical relationships between variables without understanding the processes that underpin these relationships.

The criticisms directed towards contingency theory are non-trivial and diminish the potential of studies that adopt such a theoretical framework to make noteworthy contributions towards both theory and practice. The researcher is cognisant of the above mentioned criticisms of contingency type research and attempted to change the research design in order to reduce its potential negative impact. The manner in which the research design was changed as a direct result of these criticisms is discussed in the methodology chapter (Chapter 4, Section 4.8) of this dissertation.

2.5 Conclusion

A wide variety of contingency factors have been considered, predominantly in the context of management accounting systems. While it has been established that definite associations exist between certain contingency factors and aspects of management accounting systems, it does appear that a proper matching of these variables contributes to only a small percentage in the variation of the performance of organisations. A review of the extant literature reveals that contingency theory has not been widely applied to financial accounting systems. However, a small number of articles have been published in which financial accounting systems and practices have been considered from a contingency theory perspective. Nevertheless, no academic research could be found that specifically considered consolidation systems from a contingency theory perspective. The following chapter will review some of the articles in which financial accounting systems in general were examined from a contingency theory perspective and will continue to develop hypotheses, specifically related to the decentralisation of the organisation, which will be used to examine consolidation systems in terms of a contingency theory framework.

The attempts made by researchers to use contingency theory to develop an enhanced understanding of the interrelationships among organisational sub-systems as well as between the organisational system and its environment, have not been without difficulty. A litany of criticisms has been direct towards contingency theory. While a number of the criticisms are directed more towards the application of contingency theory in particular studies (Fridman and Ostman 1989), some criticisms are legitimately focussed directly at the theory. Researchers should take note of some of these criticisms and attempt to design their research in order to minimise the deficiencies of contingency theory: Section 4.8 in Chapter 4 explains how the researcher reflected on the criticisms of contingency theory and, where possible, made necessary changes to the research design in order to reduce their negative impact.

Despite these criticisms, contingency-based research developed a long tradition in the study of accounting systems and has maintained its popularity in recent years with a constant and continuing stream of studies seeking to explore the contingent nature of accounting systems (Chapman 1997). It appears that the theory is the dominant theoretical framework that is utilised in accounting systems research (Gerdin and Greve 2004). The continual popularity of contingency theory is significant: Notwithstanding its evident shortcomings, it is clear that contingency theory possesses considerable intellectual appeal and offers researchers with a theoretical framework that that is able of offering cogent explanations for various features of the design and usage of accounting systems (Otley 1980).

Chapter 3: Hypothesis Development

3.1 Introduction

The consolidation system used by an organisation is clearly one of the sub-systems that has to be designed in accordance with the demands of the environment with which it interacts, as put forward by Burrell and Morgan (1979), and as such, contingency theory could be applied in the analysis of these systems. The corporate financial reporting system that is the focus of the theoretical model proposed by Thomas, refers mainly to the reporting practices adopted by the organisation which specifically includes accounting policies (or methods) such as depreciation policy or the capitalisation of research cost. It should be noted that the reporting practices chosen by organisations was not included in the scope of this research project. The scope of this research project is limited to the manner in which the consolidation systems are designed and used by organisations. While the use of consolidation systems are not specifically addressed in the two articles published by Thomas (1986 and 1991), the theoretical framework could credibly be applied to such systems.

Otley (1980) argued that a contingency theory of accounting should identify specific aspects of an accounting system that are associated with certain defined circumstances. This chapter will continue to review the extant literature, which will be used to advance arguments that will lead to the development of hypotheses where an association between defined circumstances and certain aspects of consolidation systems is proposed.   It will then proceed to propose an integrated model where the performance of the consolidation system is specifically considered.

3.2 Theoretical Model

The logical extension of contingency theory developments in both organisation theory and management accounting is that variations in environmental uncertainty, technology

and organisation size, give rise to differences in corporate financial reporting systems (Thomas 1986). In contrast to the application of contingency theory to management accounting information systems, the theory does not seem to have been widely applied to financial accounting, or the systems on which financial accounting is based. However, a theoretical model proposed by Thomas (1991) appears to be the first of a small number of publications (Williams 1999; Gerhardy 2002; Alesani 2008) in which financial accounting was considered in relation to contingency theory. In his 1986 article, Thomas seeks to establish whether the choice of certain financial disclosure and measurement practices is contingent upon environmental uncertainty, technology and organisational size. While the scope of the 1986 article was limited to disclosure and measurement practices, the scope of the subsequent article appears to be broader. His theoretical model (1991) extends contingency theory to corporate financial reporting systems and argues that it could provide a means of describing, explaining and predicting such systems.

In Thomas's (1991) theoretical model, contingency variables which may affect corporate financial reporting systems are grouped into four classes: societal variables; environment of the enterprise; organisational attributes; and user characteristics (refer to Figure 3). It is argued that these variables could explain the choice of management's reporting practices. The contingency variables selected by Thomas broadly correspond to those included in the model proposed by Gordon and Miller (1976) which was published in a paper considered seminal in the field of contingency theory in relation to accounting information systems.

Figure 3: A Contingency Framework for Explaining Corporate Financial Reporting Systems (Thomas 1991)
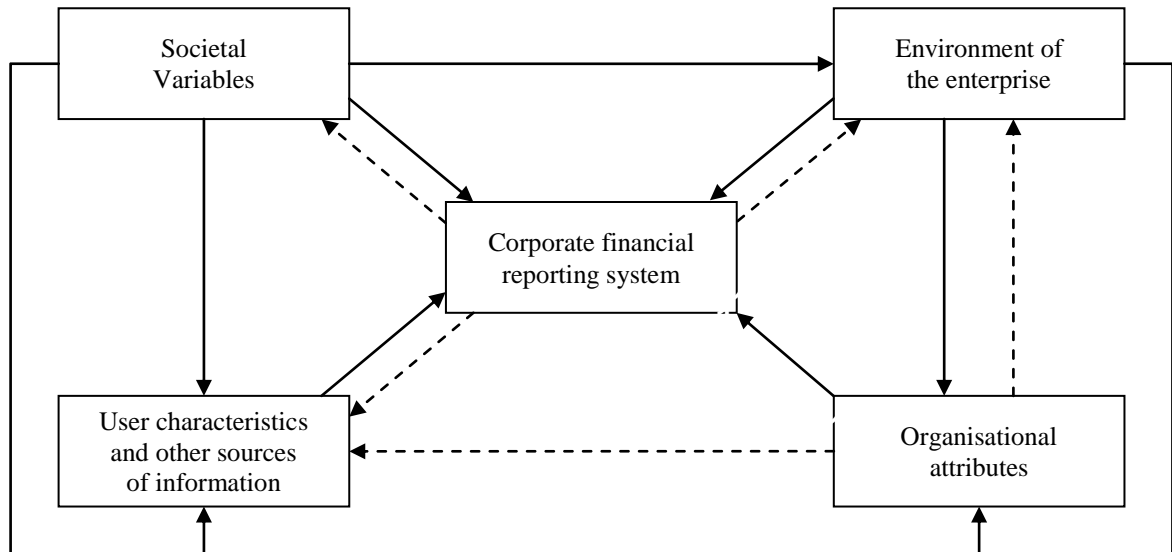
Societal variables consist of those factors to which all organisations within a particular country are subject and consist of the economic, legal and political sub-systems. The environment of the organisation could be conceived as the industry in which it operates. It is argued that the environment consists of two dimensions: a stable-dynamic dimension and homogeneous-heterogeneous dimension (Duncan 1972). Thomas proposes that organisational variables should be conceptualised in terms of the resources that are available to an organisation and the way in which these resources are organised. The two organisational attributes that receive the most consideration are organisation size and technology. Organisational size can be measured in a number of different ways, the most common being revenue, net income, number of employees or net asset value. Considerable research evidence points to the impact of different decision-making styles and cognitive traits of users during the design of information systems. It is proposed that it is reasonable to expect that such factors could influence the design of corporate financial reporting systems. Thomas also included some interrelationships between the four classes of contingent variables in his model.

Application and Development of Thomas' (1991) Model

Gerhardy (2002) proposes a model as a framework for the analysis of the relationship between accounting and the environment in which accounting is practiced. He argues that a model based on contingency theory could be used as a means of identifying and classifying environmental factors that are associated with accounting and disclosure practices. The categorisation of the contingency variables proposed by Thomas (1991) is used as the starting point for the development of the model. The nature of the environmental variables is explored in greater depth and some refinement is put forward. Gerhardy (2002) attempts to enhance contingency theory by incorporating elements of accounting ecology. Gernon and Wallace (1995) describe the accounting ecological perspective as an integrated, holistic view of the accounting landscape. Their ecological perspective consists of five 'slices': societal; organisational; professional; individual; and accounting (practices, rules and conventions). Gerhardy (2002) suggests that a fusion of contingency theory and accounting ecology provides a more complete theoretical basis for the examination of the environmental factors that influence the development of national accounting and disclosure practices.

Williams (1999) examined the voluntary environmental and social accounting disclosure practices in the Asia-Pacific region. The claim by Thomas (1991) that reporting practices in every country are contingent upon societal variables, is essentially tested in this study. Empirical evidence is presented which, it is claimed, provides some explanation of the variations in the extent of the voluntary accounting disclosure by organisations in their annual reports. Williams (1999) uses mainly the societal variables of Thomas' (1991) model in order to develop seven hypotheses that are tested by means of content analysis of the annual reports of listed companies in this region. It is concluded that the cultural dimensions of uncertainty avoidance and masculinity are significant determinants of the quantity of the voluntary accounting information disclosed by listed companies in the Asia-Pacific region.

Alesani (2008) further developed the model proposed by Thomas (1991) by utilizing contingency theory in conjunction with legitimacy theory to investigate the main factors that influence the level of accountability of public and private sector organisations. Proponents of legitimacy theory contend that an organisation can remain successful only by appearing to act in ways that society regards as acceptable, thus enabling them to be considered legitimate (Dowling and Pfeffer 1975). Alesani (2008) argues that instead of regarding legitimacy and contingency theory as conflicting approaches, they could be used in a complimentary manner to explain the differences in the level of disclosure of organisations. Alesani (2008) contends that organisations project their legitimacy by means of corporate disclosure. One of the main theses of Alesani's work is that a combination of contingency and legitimacy theory can be used to explain variations in the corporate financial reporting systems and practices of organisations. Thomas' (1991) classification of contingency variables is used as a basis for the further development and discussion of contingency theory in relation to legitimacy theory in the context of international intergovernmental organisations.

3.3 Contingency Variables

No contingency studies could be found in published literature that specifically examined consolidation systems. It was therefore not possible to consider contingency variables used by previous contingency studies in the specific context of consolidation systems. As a result, it was necessary to determine which of the contingency variables that are commonly used by other contingency studies could realistically be applied to consolidation systems. The knowledge and experience of the researcher was applied to identify the contingency variables that would most likely be associated with certain consolidation system characteristics.

A long stream of evidence suggests that organisational issues are perceived to be of great importance to the successful outcome of systems development projects (Doherty and King 1998). This apparent relationship between organisational issues and

information systems is corroborated by a substantial body of literature which indicates that the design of management accounting systems is influenced by organisational characteristics such as structure, size and the type of technology (Blau and Schoenherr 1971; Merchant 1981; Chenhall 2003). A logical extension of the conclusion of these studies is that certain organisational characteristics would also influence the design and use of consolidation systems.

Lawrence and Lorsch (1967) referred to organisational structure as the manner in which the organisation is differentiated and integrated: differentiation relates to the extent to which sub-unit managers are allowed to act as quasi entrepreneurs; while integration is concerned with the extent to which sub-units act in ways that are in agreement with the organisational goals. Lawrence and Lorsch (1967) argue that differentiation is achieved by means of decentralisation, while integration is accomplished by means of, amongst others, rules and operating procedures. It is proposed by this research that the consolidation system is one way that a decentralised organisation could achieve greater organisational integration, since the consolidation system collects financial results from every sub-unit, which in turn is used to allocate organisational resources. Consequently, organisational decentralisation and the consolidation system (being one way of enhancing organisation integration), could be viewed as forming an integral part of the organisational structure. As such, it is expected that a relationship will exist between the level of organisational decentralisation and the consolidation system.

Complex administrative tasks necessitate the delegation of sub-tasks and responsibilities to lower levels of management in order to ease the burden of decision making (Gordon and Miller 1976). The decentralisation of power and responsibilities is often accomplished by the creation of operationally independent entities. A decentralised organisation would have to tailor specific parts of the accounting system to suit the needs of these operationally independent entities. Such tailoring could be evident in the creation of separate general ledger or ERP systems for each of the distinct subsidiaries or operating units. The consolidation system would necessarily have to be designed in such a manner to effectively receive and process accounting

information from the increased number of distinct accounting systems. The extent of a company's decentralisation could therefore be considered as a contingency variable since it is expected to influence the design and use of the consolidation system.

The number of reporting entities that are contained in the listed organisation has been judged to be the most reliable indicator of the extent of decentralisation. A distinction should be made between a reporting and a legal entity: while a legal entity would invariably also be a reporting entity, it is possible that one legal entity could be divided up into more than one reporting entities. The possibility does exist that a decentralised organisation could be organised into a small number of reporting entities. However, it is much more likely that a decentralised organisation will be organised in numerous reporting entities, each of which would be required to submit financial information for consolidation.

Multicollinearity is a statistical term for the existence of a high degree of linear correlation (positive or negative) amongst two or more independent variables. Such a condition makes it difficult to separate the effects of the independent variables on dependent variables. Many contingency studies include organisational size as a contingency variable (Pugh, Hickson et al. 1969; Bruns and Waterhouse 1975; Merchant 1981). In most such cases, organisational size is measured by means of turnover, while some studies also consider the number of employees or market capitalisation. The turnover of all research participants was collected, an analysis of which has been included in the descriptive statistical analysis section 5.2.1 of Chapter 5. However, turnover has not been included as an independent variable in the research model due to the strong multicollinearity with the decentralisation variable.

3.4 Omitted Independent Variables

Most independent variables that are normally considered part of other contingency studies have been omitted from this research. This section will provide some

justification for the omission of the variables that were part of the theoretical model proposed by Thomas (1991).

3.4.1 Societal Variables

Societal variables – being the economic, legal and political sub-systems to which all organisations in a particular country are subject – have been omitted from the scope of this research. The principal reason for the exclusion of this variable is the emergence of International Financial Reporting Standards (IFRS) as the dominant accounting regulatory framework. IFRS is required or permitted as the accounting standard in approximately 100 countries, including the European Union, South Africa, Hong Kong, Australia, India and Russia. The convergence of accounting standards around the world towards a generally accepted standard is expected to reduce the variability in accounting regulation between countries. While other societal variables – such as the political factors – should not be discarded, it is anticipated that accounting regulation will be the most significant societal variable that influences consolidation systems. It was therefore decided to exclude societal variables from the scope of this research because of the expectation that limited dissimilarity in the values of societal variables that influence the design and use of consolidation systems would be found.

3.4.2 User Characteristics

System users characteristics is an independent variable included in several contingency models of accounting information systems, most notably in the model proposed by Gordon and Miller (1976). However, Hofstedt and Kinard (1970) argue in favour of the inverse – that accounting information systems influence the decision making behaviour of managers. Whether causality flows from user characteristics to some characteristics of the accounting system, or visa versa, is not entirely relevant at this point. What has been established though is that a relationship between these two variables is expected to exist.

Nevertheless, user characteristics were excluded as an independent variable from this research because it was judged that it would not have been possible to measure, with an acceptable degree of accuracy, the characteristics of the system designers and users. It is most often the case that organisations do not possess the expertise and/or the capacity to complete the design, development and implementation of such a complex system. As a result, external consultants are typically used to provide the necessary expertise and capacity to implement consolidation systems. Once the implementation has been completed and the administration of the system has been transferred to the organisation, these consultants leave the organisation. In addition, normal employee turnover would also result in a continual change in the profile of the system users. It is the opinion of the researcher that the data necessary to assess the characteristics of the system designers and users could not be measured with an acceptable level of accurately and would not be readily available. The nature of the research methods would also have to change considerably if such data were to be collected.

3.4.3   Other Omitted Contingency Variables

A number of contingency variables identified in the literature were not considered to have an influence on the performance of the consolidation system – in other words, the ability of the system to facilitate a rapid consolidation. Such variables were excluded from the research since the scope was limited strictly to contingency variables that were expected to eventually influence the performance of the consolidation system. For example, technology – which is conceptualised in terms of the routineness or non-routineness of operations – is often included by contingency studies as an independent variable. Contingency studies commonly measure technological sophistication by means of the capital intensity of the organisation. It was expected that a more capital intensive company would use the consolidation system to capture its capital budgets and that the budgeting period would extend longer into the future. Technology could therefore have been included in the scope of this research project as a contingency

variable. However, it was decided to exclude technology as a contingency variable since it could not be conceptualized that the completion, or otherwise, of capital budgets on the consolidation system would have any impact on the ability of the consolidation system to facilitate a rapid consolidation at the financial year-end.

3.5 Consolidation System Characteristics

Figure 3.1: Research Model
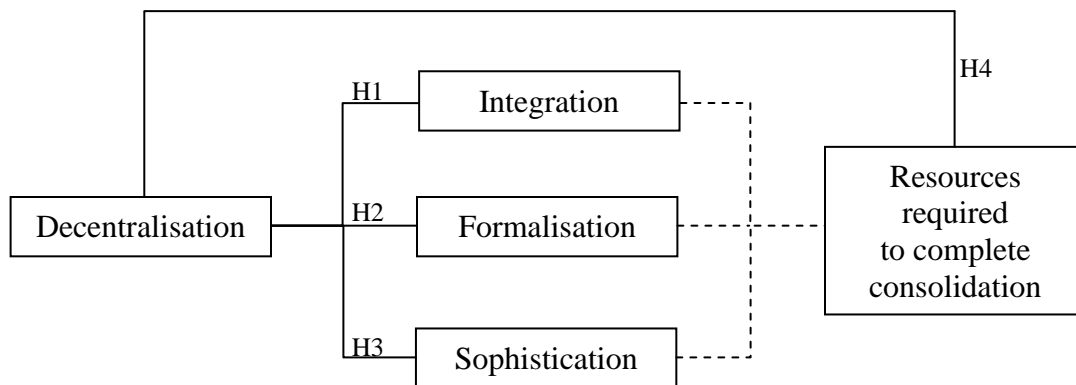
3.5.1   Integration

Integration refers to the amount of automated data transfer between the sources of the consolidation data (such as the GL or the year-end information packs submitted by subsidiaries) and the consolidation system; and also the extent of automated data transfer from the consolidation application into reports (both management reports and the annual financial statements). The integration of the consolidation system is important because it reduces the need for the menial re-entering of data and also because it diminishes the likelihood of errors taking place during the data transfer process due to human mistakes.

During the consolidation process, the financial data contained in the general ledger or ERP system of each subsidiary, joint venture or associate has to be collected, converted to a common chart of accounts and loaded into the consolidation system. Integration is not important when only a small number of entities submit data for consolidation: in such cases, it would be feasible for group accountants to manually re-enter the financial data of every reporting entity into the consolidation system. A highly integrated consolidation system would therefore not be essential for an organisation that contains a small number of entities. However, when a large number of entities submit data for consolidation, the manual re-entering of data becomes error-prone and would consume a large amount of human resources. The automated data transfer that is brought about by means of greater system integration would therefore result in substantial benefits to a decentralised organisation. Chenhall and Morris (1986) noted that the accounting systems of decentralised organisations have to be adapted to the individual needs of the sub-units. Greater decentralisation is therefore expected to accompany more variation in the accounting systems of the organisation, which would necessitate greater control (Nicolaou 2000). More variety in the accounting systems of an organisation would require additional integration during the consolidation process in order to bring together the financial data contained in the dissimilar general ledgers. Chenhall (2003) proposed that decentralisation is associated with the management control system characteristic of integration. It is therefore expected that decentralised organisations would be more likely to make use of a consolidation system that is properly integrated. These arguments lead to the first hypothesis:

H1: Greater organisational decentralisation is positively related to consolidation system integration.

It is expected that an integrated consolidation system would be characterised as follows:

1. Accountants are **not** required to extract data from the general ledger and manually capture data into spreadsheets from where it is transferred into the consolidation system.

2. Transferring data from the consolidation system into financial reports does **not** require manual effort by accountants.

3. Accountants are **not** directly involved in transferring general ledger data into the consolidation system.

4. Once the initial setup has been completed, the internal management financial reports are automatically populated with the consolidated data.

5. Once the initial setup has been completed, the external financial reports (publicised financial statements) are automatically populated with the consolidated data.

3.5.2   Formalisation

Sharma (2002), Bruns and Waterhouse (1975) and Merchant (1981) contend that as organisations increase in size, it becomes progressively more demanding to control the exponentially increasing range of activities through informal mechanisms. They observed that larger organisations were decentralized and employed formal control devices to facilitate effective planning and control of activities. However, smaller centralised organisations were able to control their activities through centralized informal processes such as direct supervision and oral communication (Waterhouse and Tiessen 1978). Child and Mansfield (1972) also found that as organisations increase in size, managers can only effectively control the greater quantities of information by implementing internal controls such as rules, documentation, specialisation of roles and greater decentralisation.

A number of studies of organisational design suggest that formalised and specialised organisational structures develop as a result of increases in the size and complexity of the organisation (Pugh, Hickson et al. 1969; Child 1974a). Accounting systems adapt to increases in the formalisation and specialisation of organisational structures by

becoming increasingly formalised and sophisticated (Thomas 1986). Burns and Waterhouse (1975) also found that a more formal administrative control strategy was followed by larger organisations, while smaller centralised organisations adopted an 'inter-personal' approach to control where greater individual participation by middle managers in budget-related activities was observed. Chenhall (2003) also found that large firms with sophisticated technologies that are decentralised are associated with a strong emphasis on formal internal control systems. Gordon and Miller (1976) seemed to prefer the term 'bureaucratisation', instead of formalisation used by Thomas (1986), to describe increases in the structure, specialisation and narrowly prescribed nature of accounting functions in larger organisations. In the context of consolidation systems, the term formalisation refers to the official specification of consolidation processes, working practices and roles of organisational members or groups. It is expected that consolidation systems will also respond to increases in organisational size and complexity by becoming progressively more formalised.

These arguments lead to the second hypothesis:

H2: Greater organisational decentralisation is positively related to consolidation system formalisation.

It is expected that a formalised consolidation system would be characterised as follows:

1. Each user would obtain access to the consolidation system with a username and password that is unique to that individual.
2. All users with access to the consolidation system **cannot** perform all functions.
3. Any users with access to the consolidation system **cannot** view all the data.
4. Users **cannot** make permanent design changes to the consolidation system without the need to obtain pre-authorisation.
5. New users of the consolidation system are granted access only after specific documented approval has been granted.
6. The training provided to new users of the consolidation system is **not** mainly informal on-the-job training.

7. A person with access to the company IT network will **not** automatically have access to the consolidation system.

8. The system administrator **cannot** make permanent design changes to the consolidation system without the need to obtain pre-authorisation.

9. Any permanent design changes to the consolidation system are subject to a formal change control process that requires proper authorisation.

10. New users are allowed access only after they have attended a training course of the consolidation system.

The formation of the Public Company Accounting Oversight Board (PCAOB) was ordered by the Sarbanes-Oxley Act to oversee the auditors of public companies in the United States. In May 2007, the PCAOB adopted Auditing Standard No. 5, "An audit of internal controls over financial reporting that is integrated with an audit of financial statements" (AS5). This standard aims to increase the likelihood that material weaknesses in internal control will be detected before it could result in a significant misstatement in financial statements. The majority of AS5 is not directly relevant to this research, but it is a useful guide relating to the requirements of the internal controls that should exist in a formalised accounting system. However, some issues that are discussed in the statement are directly relevant to this research and were included in the questionnaire in order to assess the extent of formalisation of the consolidation system. One important point made by AS5 is that "a smaller, less complex company might achieve its control objectives in a different manner from a larger, more complex organization". It continues to explain that smaller organisations necessarily have fewer employees. Consequently, certain internal controls, such as the segregation of duties that will be considered essential in larger organisations, will not be feasible in smaller companies. The point made by AS5 appears to concur with the hypothesis that increases in the size and complexity of organisations will be associated with increases in the formalisation of the consolidation system.

3.5.3   Sophistication

Cadez and Guilding (2008) claim that the positive relationship between accounting system sophistication and company size is an enduring finding (Merchant 1981; Libby and Waterhouse 1996; Guilding 1999). Hoque and James (2000) argue that company growth necessitates increased accounting system specialization and sophistication. It was also mentioned in the preceding section that specialised organisational structures have been found to develop as a result of increases in the size of the organisation (Pugh, Hickson et al. 1969; Child 1974a), which in turn lead to increases in the formalisation and sophistication of accounting systems (Thomas 1986). Khandwalla (1972) found that decentralised organisations make use of sophisticated controls. Consequently, it is expected that consolidation systems will respond to increases in organisational size and decentralisation by becoming more sophisticated.

The extent of decentralisation is particularly relevant to the consolidation system due to the need to eliminate inter-company transactions during the consolidation process. The number of inter-company transactions has been found to increase exponentially as the number of entities within the group increases, in other words, as the extent of decentralisation increases. The matching and elimination of large numbers of inter-company transactions is a complex process that normally involves a coordinated effort between entities that are geographically dispersed. Consolidation systems that possess sophisticated features enable organisations to facilitate this matching and elimination process. It has been found that large numbers of inter-company transactions simply cannot be matched and eliminated by means of a purely manual process. In such a situation, it becomes increasingly important to use an automated functionality that is made available by some consolidation systems. It is therefore likely that decentralised organisations will make use of sophisticated consolidation systems that could facilitate the inter-company transaction matching elimination process.

These arguments lead to the third hypothesis:

H3: Greater organisational decentralisation is positively related to consolidation system sophistication.

The manner in which accounting systems in general and consolidation systems in particular are used, advances continually. Practices that were considered sophisticated a decade ago are regarded as standard today. However, in terms of the current usage patterns of consolidation systems, it is expected that a sophisticated consolidation system would be characterised as follows:

1. The accounting entries necessary to eliminate inter-company transactions (revenue or expenses) are automatically generated by means of the consolidation system.
2. The accounting entries necessary to eliminate inter-company balances (assets and liabilities) are automatically generated by means of the consolidation system.
3. The consolidation system includes budgeting and forecasting data.
4. The consolidation system includes non-financial data.
5. The consolidation system automatically generates the necessary accounting entries to consolidate investments in subsidiaries, joint ventures and associate companies.
6. The consolidation system automatically calculates all the values that are contained in the consolidated Cash Flow statement.
7. The consolidation system automates all foreign exchange calculations.
8. The consolidation system automatically performs validation calculations on stored values.
9. The consolidation system is used to perform the entire tax calculation.

3.6 Resources Required to Complete the Consolidation

The aim of this research is to explain variations in the performance of the system in terms of the relationships between the contingency variable and the characteristics of the consolidation system. An assumption is made that improved performance of the consolidation system will result in an improved performance of the organisational sub-unit that performs the consolidation. Contingency based research has traditionally assumed a link between the system success and organisational performance (Ifinedo 2007). This research is therefore consistent with the traditions of other contingency studies in that respect. Figure 3.2 represents the contingency approach of this research (adapted from Weill and Olson 1989).

Figure 3.2: Representation of Contingency Research in Consolidation systems
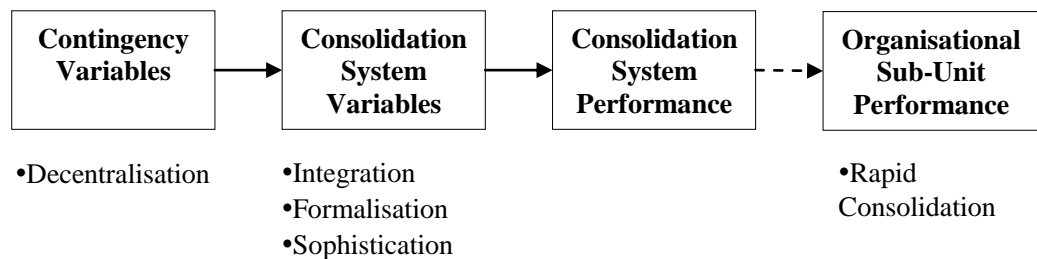
A crucial assumption of this research project is the existence of a relationship (represented by the dotted arrow in Figure 3.2) between the performance of the consolidation system and the performance of the organisational sub-unit that is responsible for consolidated financial statements. It is not difficult to justify the validity of this assumption: The consolidation system is a crucial tool for the organisational sub-unit that performs the consolidation and is heavily relied upon,

particularly by large organisations, to facilitate the consolidation process. A consolidation system that is properly designed and used has the capacity to greatly improve the accuracy and timeliness of financial information. KPMG, the international accounting and auditing firm, conducted a survey of 167 companies and questioned them regarding their experiences of the financial year-end close process. In the survey, it was established that 71% of respondents considered the implementation of a consolidation and reporting tool to have had a high impact on their ability to perform a fast close (KPMG 2006).

However, stating that a properly designed and used consolidation system has a high impact on an organisation's ability to perform a rapid consolidation, does not imply that it is the *only* factor that contributes substantially to this ability. It is acknowledged that other factors, such as, but not limited to, a standardised month-end process; properly trained and qualified staff; improved communication; and organisational wide support for the financial close process, also contributes to the ability to complete the consolidation rapidly. The potential of these other factors to obscure the results of the research is acknowledged, but it is a general shortcoming of any research project that adopts a contingency framework.

The performance of information systems is typically operationalised by means of perceptual measures such as user satisfaction (Ives, Olson et al. 1983), system success (Martin 1982), or the extent of system use (Lucas 1975; Ginzberg 1979). This study will not measure the performance of the system directly, but will assume (the justification for which was provided above) that a relationship exists between the performance of the consolidation system and the performance of the organisational sub-unit that is responsible for consolidated financial statements.

This research will attempt to test whether a match between a company's information requirements and the information made available by the consolidation system is likely to result in improved performance of the organisational sub-unit that performs the consolidation. Consequently, a critical part of the research design would involve the

selection of a suitable measure of performance for the organisational sub-unit that performs the consolidation. Most contingency studies that do measure performance of the organisational sub-unit generally defines performance by means of financial measures such as return on investment, profit, or the net asset value (Weill and Olson 1989). The performance of the organisation as a whole is generally operationalised by means of financial measures, such as profitability (Saunders and Scamell 1986), or volume measures such as sales growth (Cron and Sobol 1983). Hayes (1977) noted that the use of financial data in performance evaluation in certain contexts is not appropriate. The balanced scorecard concept popularised in the 1990's, which combines financial measures with human considerations to provide a more comprehensive view of the performance of an organisation, adds weight to the argument proposed by Hayes.

Figure 3.3: Financial Year-end Time Line
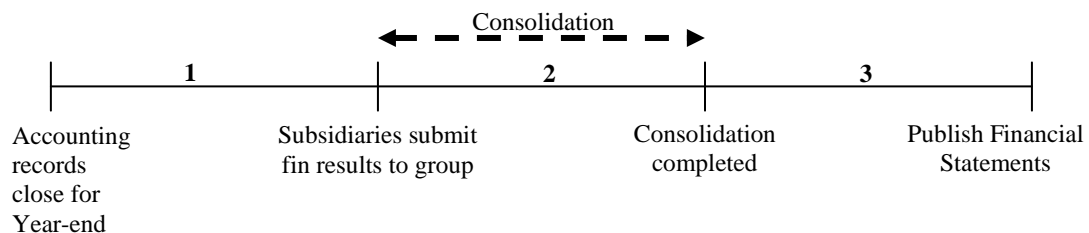
In the context of consolidation systems, it was judged that the most appropriate measure of organisational performance will be the resources that were required to complete the consolidation during the financial year-end. This measure is calculated by determining the number of days that were required to complete the consolidation, multiplied by the number of group accountants that completed the consolidation at the group level. Figure 3.3 presents a typical timeline of activities that take place during the financial year-end consolidation process of a listed company. The process commences with the year-end of the organisation. During phase 1, every subsidiary, joint venture or associate company that forms part of the listed organisation performs

the necessary calculations and adjustments to finalise the financial results of that individual entity. This process is normally performed on the general ledger of the particular entity. Each individual entity would then submit their financial results to the group, typically by providing the group accountant with a detailed trial balance, or the submission of the data directly into the consolidation system. During phase 2, the consolidation of the financial results takes place, after which the consolidated financial results is presented to the internal users, typically the executives and / or the board of directors. Phase 3 is used to obtain the necessary internal approval of the financial results and prepare the published annual financial statements. Phase 3 is completed once the financial statements are presented to external users such as the shareholders and media.

It is important to note that the performance of the organisational sub-unit that completes that consolidation will be measured by means of the resources that are required to perform the consolidation only (phase 2). The completion of phase 2 with fewer resources would suggest that the organisational sub-unit performed better than that of a similar organisation that required more resources to complete the consolidation process. In addition, it should be established how many hours were worked per day during the consolidation phase of the year-end process. This information should be used to adjust the consolidation period to ensure comparability. Without such adjustments, consolidation periods would not be comparable if, for example, the group accountants at one company worked 16 hours per day during the consolidation period, while the group accountants at another company worked a normal eight hour day. While data will be collected and analysed regarding the duration of the entire financial year-end process (phases 1, 2 and 3), only phase 2 will be used to measure performance.

It has been established that the number of entities that are contained in the organisation is one of the most significant contributors towards the complexity of the consolidation. All else being equal, it would be expected that a more complex consolidation would require more group accounting resources to complete the process. More group accounting resources would be required because the following tasks, amongst others,

will necessarily take longer to complete when a greater number of entities are included in the consolidation: matching and elimination of inter-company transactions; elimination of the share capital and retained earnings of subsidiaries that were present at acquisition; accounting for minority interest; and foreign exchange translations and the accompanying calculation of the foreign currency translation reserve.

These arguments lead to the fourth hypothesis:

H4: Greater organisational decentralisation is positively related to the group accounting resources required to complete the consolidation.

3.7 Integrated Performance Model

One of the central tenets of contingency theory in accounting information systems is that if a match (or a fit) is achieved between the information requirements of the organisation and the information made available by the system, organisational performance should result. The contingency approach applied to this research argues that a better fit between the contingency variable and the characteristics of the consolidation system will result in the improved performance of the consolidation system. This research model proposes that if the contingency factor of decentralisation matches the characteristics of the consolidation system that relate to its integration, formalisation and sophistication, then a smaller amount of group accounting resources will be required to complete the consolidation. The extent of matching between the variables that have been included in the research model (Figure 3.1) is a complex proposition due to the conditional association between numerous variables. The extent of fit therefore has to be considered holistically and not by testing relationships in isolation, such as with hypotheses 1 to 4. The statistical methods that have been applied to test the extent of fit have been described in Chapter 4.

One of the criticisms directed towards contingency theory in general, is the implicit assumption that managers should know whether the organisation fits its contingencies and how such a fit could be achieved. Donaldson (2001) argues that such assumptions are clearly idealistic and that a more realistic assumption would be that management knows in which general direction the organisation should be steered to improve its fit. He therefore explains that instead of achieving a complete fit, management should aim for a state of quasi-fit. However, it is claimed by Donaldson (2001) that a state of quasi-fit should be a sufficient improvement from a state of misfit to enhance organisational performance to such an extent that management will receive adequate positive feedback in their attempts to improve fit even further.

Gerdin and Greve (2004) argue that contingency based research often make use of different forms of fit and that researchers have not always been aware of the implications of their choice on theory building and methodology. Venkatraman (1989) expresses a similar sentiment by claiming that researchers often use different perspectives of fit interchangeably, often invoking one perspective in the theoretical discussion while making use of another during the empirical research. According to the classification system of fit developed by Gerdin and Greve (2004), this research project will adopt a Cartesian approach where the fit between contingency variables and system characteristics allows for frequent small movements by organisations from one state of fit to another. It should be noted that a prerequisite for this approach to contingency theory is that, for some organisations, the design and use of consolidation systems should deviate to a sufficiently large extent from the ideal to cause variations in performance. Continuing with Gerdin and Greve's (2004) taxonomy of forms of contingency fit, the Cartesian form of fit can further be divided into either a contingency approach – where fit is expected to positively impact on performance – or a congruent approach – which assumes a form of natural selection where only organisations that have achieved fit will survive, which renders performance irrelevant. It should be clear that this research adheres to the contingency approach to fit since the performance of the consolidation system is specifically considered.

The relationships between variables in contingency studies could be modeled in different ways, the most popular being the moderating and the mediating approaches. Table A in Figure 3.4 (adapted from Gerdin and Greve 2004) represents the moderating approach where the relationship between the independent and dependent variables is contingent upon the level of the moderating variable. A moderating variable theoretically influences the relationship between the independent variable and the dependent variable, but the moderating variable is theoretically not related with either the dependent or the independent variable (Hartmann and Moers 1999). Table B in Figure 3.4 represents the mediating approach where the relationship between the independent and dependent variables operates through the mediating variable, and where the mediating variable is dependent on the independent variable.

The relationship between the variables in the research model (Figure 3.1) conforms to the mediation form of fit since it is hypothesised that a relationship will exist between the independent variable (contingency variable) and the mediating variables (characteristics of the consolidation system).

Figure 3.4: Moderation and Mediation Forms of Fit

         Table A   **Table B**
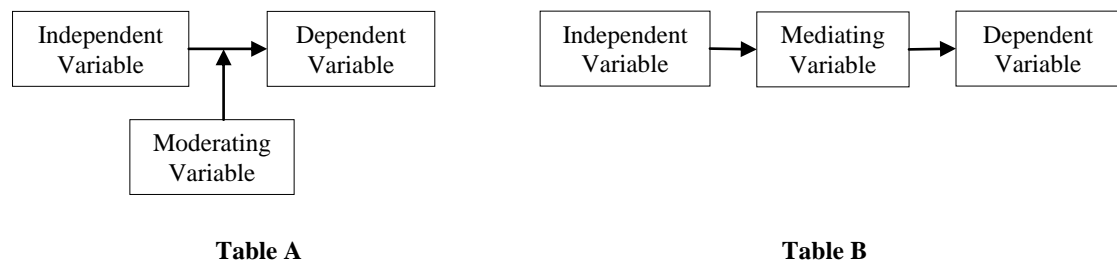
The concept of fit is complex and cannot be expressed by means of a simple single hypothesis. In the context of this research, fit could be explained as follows: Assume that it could be established that greater organisational decentralisation is positively related to the level of consolidation system sophistication (Hypothesis 3); and it could

also be established that greater organisational decentralisation is positively related to the group accounting resources that are required to complete the consolidation (Hypothesis 4). If both the two preceding statements are true and it could be established that the relationship between the level of consolidation system sophistication (mediating variable) and the group accounting resources that are required to complete the consolidation is negative, then a form of contingency fit could be established: The expectation is that greater consolidation system sophistication should contribute towards a reduction in the amount of group accounting resources that are required to complete the consolidation for an organisation with a certain level of decentralisation. In other words, it would be expected that if that same organisation made use of a less sophisticated consolidation system, then the consolidation would require more resources to be completed. The same argument could be advanced in relation to the two other consolidation system characteristics (integration and formalisation). Chenhall (2003) describes this form of contingency fit as the 'intervening model', where a study would identify the antecedents to the management control system; and would then demonstrate how the relationships between the management control system (consolidation system) and the antecedents (decentralisation) would determine the outcomes (resources required to complete the consolidation).

3.8 Conclusion

Organisational decentralisation has been identified as the contingency factor that is expected to influence the design and usage of consolidation systems. Three hypotheses (Table 3.1) have been put forward that will be used to test whether a positive relationship exists between organisational decentralisation and the three characteristics of the consolidation system. It has been proposed that the performance of consolidation systems should be measured by means of the resources that are required to complete the consolidation during the year-end process. One hypothesis (Table 3.1) has been proposed that will be used test whether a positive relationship exists between

organisational decentralisation and the resources that are required to complete the consolidation.

Table 3.1: Research Hypotheses

H1	Greater organisational decentralisation is positively related to consolidation system integration.
H2	Greater organisational decentralisation is positively related to consolidation system formalisation.
H3	Greater organisational decentralisation is positively related to consolidation system sophistication.
H4	Greater organisational decentralisation is positively related to the group accounting resources required to complete the consolidation.

An integrated research model (Figure 3.1) has been developed which will be used to assess whether the concept of fit, as advocated by contingency theory, is applicable to the context of consolidation systems. It is expected that a mediating form of fit will exist between the variables in the research model (Figure 3.1) since it is hypothesised that a relationship will exist between the contingency variable and the mediating variables. The contingency approach applied to this research argues that a better fit between the contingency variable and the characteristics of the consolidation system will result in a reduction of the resources that are required to complete the consolidation. The following chapter will explain the methods that have been applied in this research.

Chapter 4: Research Methodology

4.1 Introduction

The preceding chapters delineated the research question and then proceeded to develop a number of testable hypotheses. The purpose of this chapter is to set out the research methodology that has been adopted in order to test these hypotheses. It is of great importance that a research methodology should be appropriate for the research question and should minimise opportunities for the introduction of biases in the collection and analysis of the data and the conclusions reached on the basis of that analysis. While no research methodology is faultless, this chapter will attempt to justify the appropriateness of the research methodology and explain the steps that were taken to minimise opportunities for the inadvertent adoption of biases.

This chapter has been structured as follows: The second section discusses the philosophical perspective of this research. Section three identifies the two types of data collection methods that have been used, while the fourth section discusses the methods that were used to develop latent variables in the research model. Section five considers issues relating to the selection of a representative sample with the aim of enhancing the generalisability of the research findings. Section six addresses issues associated with the validity of the research design, in other words, whether the research supports the conclusions drawn from the results. The data analysis techniques are considered in the seventh section. Section eight explains how the researcher reflected on the criticisms of contingency theory and, where possible, made necessary changes to the research design in order to reduce their negative impact. This chapter concludes with a discussion of the ethical issues that have been encountered by this research.

4.2 Philosophical Perspective

Chau (1986) argues that mainstream accounting is grounded in a common set of philosophical assumptions about knowledge, the empirical world and the relationship

between theory and practice. The following section will provide details of the position of this research in regard to the assumptions about physical and social reality (ontology); assumptions regarding acceptable knowledge (epistemology); and the relationship between theory and research.

4.2.1   Ontology

Ontology is the study of conceptions of reality. Ontological questions could include:

- What is existence?
- What is an object?
- What are the essential features of a given object?

Social ontology questions whether social entities can or should be regarded as objective entities that have a reality external to social actors, or whether they should be regarded as social constructions created from the perceptions and actions of social actors (Bryman and Bell 2003). Objectivism is an ontological position that regards social phenomena to be based on external facts that are beyond our influence. The alternative ontological position would be constructionism which contends that social phenomena and their meanings are produced by means of social interaction and that this constructed meaning is in a constant state of flux. The ontological perspective adopted by a research project will affect the way in which the research is conducted.

As with most phenomena, consolidation systems could be considered from both ontological perspectives. The relevant question is whether objectivism or constructionism will provide a more useful framework from which to consider consolidation systems. Chua (1986) argues that mainstream accounting research is dominated by a belief in physical realism, which asserts that a world of objective reality exists that is independent of human beings. It is assumed that this independent objective reality has a determinate nature that is knowable.

This research assumes that the object of the study (consolidation systems), is independent of the subject, and that knowledge could be achieved when the subject discovers this objective reality. The hypotheses that were tested as part of this research project relate to formal properties of the object. For example, the self completion questionnaire asked of respondents whether their consolidation system possessed an ability to automatically match and eliminate inter-company balances, or whether it is able to calculate the values that are included on the Cash Flow statement. The ability of the consolidation system to perform such functions can be determined objectively and is not merely a construct of a user's perception. However, some questions were asked that could have depended on the user's perception of certain aspects of the consolidation system. It could have been possible that the same consolidation system could be perceived somewhat differently by two users. Nevertheless, the consolidation system was considered to be an object that has a concrete existence which is by and large independent of the observer's appreciation and is not merely a subjective construction of the mind.

It therefore appears that objectivism is a more appropriate ontological position for this research since a consolidation system has a reality that is external to social actors. Weill and Olson (1989) argue that contingency theory in management information systems has a highly objectivist approach since the theory assumes that an objective and measurable reality exists. Such an ontological position is based on the absence of any significant doubt that the empirical phenomena that is being observed could be a function of the researcher's personal assumptions or location in a specific socio-historical context (Chua 1986).

4.2.2 Epistemology

Epistemology is concerned with what should be regarded as acceptable knowledge in a discipline. The most significant difference between acceptable knowledge and ordinary 'knowing' is the extent to which scientific studies are aware of the possibility that

biased conclusions could be reached (Abernethy, Chau et al. 1999). A natural question would be to ask what constitutes acceptable scientific evidence on which to base unbiased conclusions. The processes of determining what should constitute acceptable knowledge is regulated by specifying the principles for assessing claims regarding truth (Chua 1986). Two generally accepted epistemological principles are that a theory is to be considered true if it is repeatedly not falsified by data collected through systematic empirical research; and that research should be scrutinised by peers.

A particularly important epistemological consideration is whether an object could be examined according to the principles of the natural sciences. Positivism is an epistemological position that supports the use of the methods of the natural sciences to the study of a social phenomenon. Positivism favours quantitative research methods while interpretivism is more inclined towards qualitative methods. A principle that is central to positivism is the notion that theory is aimed at the generation of hypotheses that can be tested, which will allow for the validity of certain laws to be assessed (Bryman and Bell 2003). Positivism has enjoyed great success in the natural sciences. However, there seems to be some unease in the application of certain aspects of positivism in the social sciences.

Contingency theory appears to be positivistic since it attempts to construct principles, or laws, that are applicable to all organisations for identified variables. Donaldson (1996) states that contingency theory claims to be positivistic since it attempts to develop scientific style theories on the basis of empirical research. The epistemological orientation of this research is positivistic since the natural scientific model has been adopted where the collection and analysis of data is quantified with the aim of testing a number of hypotheses.

4.2.3　　Research Paradigm

The nature of the relationship between theory and research could either be deductive, where theory guides research, or inductive, where theory is the product of research. Deductive reasoning operates from the general (theory) to the specific (testable hypotheses). Inductive reasoning would perform observations, from which certain generalisations (theories) would be developed. While fundamental differences exist between inductive and deductive research, it has been suggested that the distinction is often not entirely unambiguous and should rather be considered as tendencies in research as opposed to inflexible differences (Bryman and Bell 2003).

This research project is firmly deductive in nature since a particular theory (contingency theory), facilitated the development of a number of testable hypotheses in relation to consolidation systems. Empirical data was then collected that was used to enable some conclusions to be reached. The acceptance or rejection of the hypotheses enabled the theory to be confirmed, revised or rejected. The final step of the deductive research process (revision of theory), inevitably involves a certain element of induction – where theory is the outcome of research. It should be noted that while the deductive research processes appears to be strictly linear, the actual process that was followed included some iterations.

4.3 Data Collection Methods

The results of qualitative studies in academic research normally provide the starting point of a large body of quantitative research. This relationship between the two styles of research appears to exist in the field of contingency theory where subsequent studies seemed to have been content to refine existing models by means of quantitative (deductive) research (Chapman 1997). This research project continued in that tradition since contingency theory in general, and certain aspects of the model proposed by Thomas in particular, was tested by means of quantitative research methods. The

principal component of the research design was cross-sectional since data was collected relating to more than one company at a single point in time in order to gather a set of quantitative data regarding a number of variables. This cross-sectional study took the form of a survey where data was collected by means of a self-completion questionnaire.

Subsequent to the collection and analysis of the quantitative data, semi-structured interviews were conducted with a number of research participants. These semi-structured interviews were judged to be necessary in order to generate a deeper understanding of the results of the quantitative data analysis. It should be pointed out that this research project is firmly rooted in the deductive approach despite the use of a qualitative data collection method (interviews), which is traditionally employed by research that follows an inductive approach.

Child (1996) criticises contingency studies for their tendency to find significant statistical relationships between variables without understanding the processes that underpin these relationships. Other authors (Longenecker and Pringle 1978; Weill and Olson 1989) concur with this sentiment by arguing that much greater value would be obtained from an investigation into the nature of the relationship between the stated variables.

The primary focus of this research was the application of contingency theory on consolidation systems by means of quantitative research methods. Nevertheless, the presence or absence of statistically significant relationships between variables in the research model, on their own, would not have provided a meaningful insight into the actual design and usage of consolidation systems in practice. It was therefore decided to make use of qualitative research methods in order to provide an added insight into the actual functioning of consolidation systems. Semi-structured interviews afforded the researcher an opportunity to obtain an appreciation of the richness and complexities of the manner in which consolidation systems are designed and used in their social settings.

The researcher acknowledges the potential benefits of including qualitative methods in the research design, but he is also acutely aware of the risk of the inadvertent introduction of biases that could result from adopting such an approach. Nevertheless, it was found that the combination of the quantitative and qualitative methods provided sufficient rigour to the research design that it substantially reduced the risk of making biased conclusions. The combination of research methods prevented the conclusions reached on the basis of this research to be merely a listing of the statistically significant relationships in the research model, without understanding the nature of these relationships. Furthermore, the application of qualitative methods provided logical explanations for the absence of certain statistically significant mediating relationships that were expected to exist on the basis of contingency theory. It is acknowledged that the application of quantitative methods in isolation would merely have been able to observe that a particular mediating relationship is not statistically significant, but would not have been able to offer an explanation for this absence.

4.3.1   Pilot study

Dawis (1987) emphasises the importance of a pilot study, particularly when a self-completion questionnaire is used as the principal method of data collection. The self-completion questionnaire was subjected to two pilot studies. The first pilot study involved discussions with four practitioners (consultants) that are experienced in the design and implementation of consolidation systems. The integration, formalisation and sophistication constructs were discussed with the practitioners in order to obtain some assurance in regard to their validity. In addition, the practitioners were asked to complete the questionnaire in the same manner as a research participant would have been required. The questionnaire was then discussed with the practitioners in order to ascertain whether any questions should be amended or omitted, or whether different questions should have been asked. Practitioners also provided useful advice regarding additional questions that should have been included in the questionnaire which had the

potential to elicit significant data, even though such data would not have been strictly necessary to test the research hypotheses.

The second pilot study involved the completion of the questionnaire by five accountants at companies with a similar profile to those companies that formed part of the sampling frame. The questionnaire was then discussed in detail with the pilot study participants. This form of pilot study is especially important when self-completion questionnaires are used since interviewers are not present to clarify any uncertainties or correct any misunderstandings. This pilot study brought to the researcher's attention certain questions that were misunderstood and it offered the researcher the opportunity to rephrase those questions prior to the distribution of the self-completion questionnaire to the entire sampling frame.

A wide range of consolidation systems are used by companies – ranging from spreadsheets and general ledgers, to ERP systems and specialised consolidation systems. However, the same questionnaire was sent to users of all these different types of systems. The design of the questionnaire was therefore considered with care and necessitated thorough consultation with users of each type of consolidation system. The pilot study enabled the researcher to determine whether any questions were applicable to only some types of consolidation systems. Such questions were changed or omitted altogether in order to ensure the general applicability of the questionnaire.

Another important benefit of a pilot study in the context of this research project was its ability to indicate whether all the respondents (or virtually all) provided a similar answer to any particular question. Data is unlikely to be of interest if a consistent answer to any question was provided by all respondents because that particular issue being questioned would not have constituted a variable. The matter of redundant questions is especially pertinent to self-completion questionnaires since the number of questions that could be included in the questionnaire is limited in number as a result of respondent fatigue. A question which returns a consistent answer from all respondents will therefore necessarily be at the expense of another potentially useful question.

4.3.2 Self-completion Questionnaire

The primary mode of data collection was a self-completion questionnaire sent to the group accountant or consolidation system administrator. Attempts were made to contact each individual company in the sampling frame telephonically in order to send the questionnaire to the most appropriate person. An electronic version of the questionnaire was developed and e-mailed to potential respondents. The e-mail that accompanied the questionnaire has been included in Appendix A. Respondents completed the questionnaire and returned it by means of e-mail. The questionnaire results were captured by means of a computerized procedure to transfer the results to a database from where the data analysis was performed. Automating the capturing of the completed questionnaires not only reduced the effort involved in this process, but also eliminated any possible errors that could have been made if the data were captured manually.

The principal focus of the questionnaire was the collection of data that could be used as part of the inferential statistical analysis. However, questions were also included to collect some descriptive statistics. Such statistics are interesting and valuable in their own right since any recent data in this particular field apparently do not exist. These and other descriptive statistics were not only expected to enhance the relevance of the research to practitioners, but also enabled a view to be obtained of consolidation systems that was somewhat broader than the one that was concerned purely with the testing of the hypotheses. The analysis of the descriptive statistics has been documented in Chapter 5. The final questionnaire that was distributed to the companies in the sampling frame contained 54 questions. In certain instances, it was deemed necessary to place more than one question in relation to the same variable in different parts of the questionnaire. This was done in order to assess the consistency of responses that were provided in relation to critical variables in the research model.

Appendix A includes the self-completion questionnaire that was sent to the potential respondents.

It appears that cross-sectional surveys in the form of self-completion questionnaires are the most commonly used primary data collection method in contingency studies (Weill and Olson 1989; Gerdin 2005; Naranjo-Gil and Hartmann 2007; Cadez and Guilding 2008). This research is therefore consistent with a large body of contingency studies in terms of the data collection methods and should enable meaningful comparisons to be made in regard to the research methods employed and the results obtained.

Advantages and Disadvantages

The self-completion questionnaire was judged to be the most appropriate data collection method for the purposes of this research. The self-completion questionnaire and the structured interview are similar in many respects. The most apparent difference between these two forms of data collection is that the there is no interviewer to ask and clarify questions with the self-completion questionnaire. As a result, the questions included in the self-completion questionnaire have to be particularly clear and easy to understand, otherwise respondents might misunderstand the questions and provide an incorrect answer, or abandon the questionnaire altogether.

One of the most significant advantages of a self-completion questionnaire in the context of this research project is that it is much cheaper to administer compared to structured interviews. As a result, the sample size could be substantially larger for any given budget, thus leading to a more representative sample. Another notable advantage of the self-completion questionnaire is that the individual characteristics of interviewers will not influence the response obtained to questions. It has been shown that the ethnicity, gender and social background of the interviewer may combine to bias the answers that respondents provide (Bryman and Bell 2003). The absence of an interviewer

eliminated any potential interviewer bias, which resulted in a more consistent response to have been obtained from the self-completion questionnaire.

Self-completion questionnaires have a number of disadvantages when compared to structured interviews. Firstly, respondents cannot be prompted when they experience difficulty in understanding a question. It is therefore particularly important to phrase questions in an unambiguous manner. Secondly, the number of questions that can be asked by means of a self-completion questionnaire is limited. While respondent fatigue could also be a factor to be considered with structured interviews, the personal presence of the interviewer will place the interviewee under some form of pressure to complete the interview. Generally, respondents do not experience such a pressure when a questionnaire is completed and will be fatigued if the number of questions are excessive. Respondent fatigue will be particularly acute if questions are asked that are not salient to the respondent. Respondent fatigue often leads to the abandonment of the questionnaire. A third disadvantage of the self-completion questionnaire is that a limited number of open-ended questions can be asked since respondents do not want to write a great deal during the completion process. As a result, the questionnaire should include mainly questions with a limited range of responses. Also, if some open-ended questions are included, it is not possible to probe the respondent to elaborate on the answer provided.

One aspect of the self-completion questionnaire that should be considered is that answers to questions might not have been an accurate reflection of reality. It could be the case that when accountants provide an answer to a question which is contained in the self-completion questionnaire, they attempted to portray their consolidation system in the best possible light and therefore rate a particular aspect of the accounting system more favourably than it actually is. Such a distortion of reality could be particularly acute when the participant was personally involved in the design and development of the system, in which case the participant will transfer any criticism or negative perception of the consolidation system to himself/herself. A distortion of the answers provided could be minimised by emphasising in the introduction to the questionnaire

71

that there is no one correct answer, and that all answers will be treated anonymously and confidentially. It should be pointed out that this disadvantage of questionnaires will equally apply to structured interviews and could potentially be more severe as a result of the dynamic generated by the personal contact between interviewer and interviewee.

A cross sectional study takes measurements of the relevant variables at the same point in time. As a result, the measurements of fit and the performance of the system will be taken simultaneously, which could lead to a potential defect of the research design: if a significant recent change occurred in one of the independent (contingency) variables, then any potential time delay for the causal relationship to take effect would distort the research findings. This potential deficiency will apply equally to all cross-sectional based research. The possibility that such a situation could influence the research findings has been acknowledged but the likelihood that it materially influenced the findings was judged to be remote.

Scale Design

A scale is a tool that is used to distinguish individuals as to how they differ from other individuals in relation to the variables of interest to the research (Sekaran 2003). The responses to a collection of items on a measure would be scored and combined to provide a quantitative scale score. This research made use of scales in order to obtain quantitative data relating to the following variables for which standardised instruments were not available: integration, formalisation and sophistication of the consolidation system. The Likert scale – a type of an interval scale – was used since it allows for certain arithmetical calculations to be performed on the data that has been collected. An interval scale possesses properties of magnitude (one instance of the attribute being measured can be judged greater than, equal to, or less than another instance of that attribute) and equal intervals, but it does not contain an absolute zero point (McCall 1986). The Likert scale examines how strongly respondents agree or disagree with

statements on a 5-point scale. The scale anchors that were used in this research are: 1 – Strongly disagree; 2 – Disagree; 3 – Neutral / don't know; 4 – Agree; 5 – Strongly Agree.

It is generally recommended that multi-item Likert scales should include both reversed and non-reversed items (Swain, Weathers et al. 2008). One of the principal reasons for the inclusion of reversed questions in the questionnaire is to reduce bias that may occur in a scale as a result of acquiescent respondents (Watson 1992). Acquiescence refers to the tendency of some respondents to consistently agree or disagree with a set of questions by the repeated selection of responses on the same side of the scale neutral. However, despite the potential benefits of reversing a number of questions in the questionnaire, it appears that some researchers have found it to have contributed towards diminished scale reliability (Herche and Engelland 1996). The questionnaire used in this research project included a mixture of reversed and non-reversed questions.

Likert scales are often criticized for being a relatively coarse measure and that as a result, information loss occurs which reduces the probability of detecting relationships between variables (Russell and Bobko 1992). Respondents may also view the difference between the options at the extreme ends of the scale to be insignificant. For example, if a respondent is in agreement with a statement regarding the consolidation system, an arbitrary selection might be made between the "Agree" and "Strongly Agree" options to the item. It could also be possible that two respondents might have the same intensity of feeling towards a statement regarding the consolidation system, but they might view the semantic description of their feelings differently (Albaum 1997).

Factor analysis is a modeling approach that is used to examine unobservable, hypothetical variables such as intelligence or motivation, generally referred to as latent variables. The latent variables in this research model are integration, formalisation and sophistication. These latent variables are indicated by various directly measureable proxies (indicators), which are the scores obtained by participants on certain items of

the questionnaire. Confirmatory factor analysis was used to test and quantify the relationships amongst the proxies and the latent variables. As a result of the confirmatory factor analysis, some minor modifications were made to the proxies that relate to each of the latent variables in the research model. This process has been discussed in greater detail in section 5.3.1.

4.3.3 Semi Structured Interviews

A deductive approach based on quantitative data collection methods was judged to be the most appropriate for the evaluation of the well established theoretical framework (contingency theory) in the context of consolidation systems. A survey based approach to data collection provides the researcher with a generic view of subject matter, but a more qualitative approach could be used to 'fill the gaps' and enrich the findings (Woods 2009). The loss of the 'richness' of data that is a consequence of a quantitative approach to data collection prompted the researcher to consider additional methods of data collection. Jones (1986) argues that a qualitative approach to accounting systems research is necessary because such studies will facilitate the further development of existing theories by providing explanations of how accounting systems function in practice.

Qualitative interviewing was considered as an additional data collection method since it places greater emphasis on the interviewee's point of view (Bryman and Bell 2003). This form of interviewing tends to be flexible – responding to the direction in which an interviewee takes the interview and perhaps adjusting the emphasis of the interview as a result of significant issues that emerge. Semi-structured interviews were thought to be a suitable form of interviewing since it provided the most appropriate combination of flexibility and structure. Structure was necessary to ensure that a number of specific topics were discussed, which could not be assured if unstructured interviews were conducted. An element of flexibility was considered necessary in order to capture

details relating to aspects of the consolidation system and the year-end close process that was not included in the self-completion questionnaire.

Eight interviews were conducted during the months of October and November 2008. Interviewees were selected from the 210 companies that completed the self-completion questionnaires. The initial quantitative analysis of the data collected by means of the questionnaires, provided some guidance on the companies that were asked to participate in the interviews. Table 4.1 provides some information on the participating companies.

Table 4.1: Semi-Structured Interviews Participants

Company	Industry	Turnover *	Entities in Group	Number of days to publish results
1	Financial Services	52	18	25
2	Financial Services	104,449	1,800	78
3	Gold Mining	19,693	44	32
4	Publishing	318	36	85
5	Financial Services	50,855	350	65
6	Construction	2,544	24	80
7	Logistics	34,229	250	71
8	Hotels and Gambling	6,937	54	59

* South African Rand – Million.

Interviewee Selection Criteria

In terms of the semi-structured interviews, it is clearly important to select interviewees that would provide a balanced view of the design and usage of consolidation systems by South African listed companies. The selection of interviewees that would provide

such a balanced view requires the establishment and proper application of suitable selection criteria. The use of inappropriate selection criteria, or the improper application of appropriate selection criteria, is likely to have resulted in a distorted view of the design and usage of consolidation systems. It should be emphasised that interviewees were not selected randomly, which would have been necessary if inferences were to be made from the results of the data analysis: Qualitative research does not aspire, nor is it able to achieve a high level of external validity, in other words, this method does not enable generalisations to be made from the conclusions reached.

Interviews were conducted after descriptive statistical data analysis was completed. The results of the descriptive statistical analysis enabled the researcher to select suitable potential interviewees on the basis of certain selection criteria. Interviewee selection criteria could be divided into two classes: primary and secondary. Primary selection criteria were of significant importance and compliance to these criteria was crucial in order to obtain a balanced view of consolidation systems. Secondary selection criteria were of less importance but compliance would be beneficial.

The first primary interviewee selection criterion was the type of consolidation system used by the listed company. Three different types of consolidation systems were devised to facilitate the descriptive statistical analysis: Spreadsheets; General Ledger Modules; and Specialised Consolidation Systems (refer to section 5.2.1). Companies were selected in order to ensure that all three types of consolidation systems were represented by interviewees. The application of consolidation system type as a primary selection criterion resulted in the following composition of the sample of semi-structured interviews participants: Spreadsheet – companies 1 and 7; General Ledger Modules – companies 4, 5 and 6; Specialised Consolidation Systems – companies 2, 3 and 8. The second primary selection criteria related to the extent of organisational decentralisation, in other words, the number of reporting entities in which the group is organised. Table 4.1 provides information relating to the number of entities of each company represented by an interviewee participant. It can be seen that the application of this selection criterion resulted in the inclusion of companies with varying degrees of

decentralisation, ranging from the relatively centralised Company 1, which comprised out of 18 reporting entities; to the decentralised Company 2, which comprised out of 1800 reporting entities.

The secondary criteria were applied to the selection of interviewees, not only to ensure that a balanced view was obtained of the design and usage of consolidation systems, but also to select participants with interesting characteristics. The first secondary selection criterion was company turnover, which is a commonly used indicator of size in contingency studies (Pugh, Hickson et al. 1969; Bruns and Waterhouse 1975; Merchant 1981). The level multicollinearity that is generally accepted to exist between company size and turnover would suggest that more decentralised companies would have a higher turnover. The "Turnover" and "Entities in Group" figures relating to each company in Table 4.1 would suggest that multicollinearity is applicable to interview participants. Nevertheless, it was aimed to select companies with varying levels of turnover to ensure that individuals representing large companies (e.g. Company 2) and small companies (e.g. Company 1) were interviewed. The final secondary selection criterion was the number of days that companies use to publish results to stakeholders. This criterion was used because it was found during the descriptive statistical analysis of the questionnaire data, that the number of days required by companies to publish financial results varied significantly. For example, Company 3 published financial results after 32 working days, while Company 4 required 85 working days. Interviewing these companies provided the researcher with an opportunity to gain an understanding of the factors that influenced the number of days they required to complete the year-end consolidation process. The researcher is of the opinion that the combination of the primary and secondary selection criteria provided a good basis for the selection of interviewees, resulting in a balanced qualitative view of the design and usage of consolidation systems by South African listed companies.

Interview Process

The purpose of conducting the semi-structured interviews was to obtain a more in-depth understanding of the perception of interviewees relating to the factors that influence the design and use of consolidation systems by listed companies, and also to understand the relationships between these factors. The interviewer neither mentioned any two variables in relation to each other, nor presented the research model to interviewees. The presentation of the research model, or requesting the interviewee to discuss a relationship between two specified variables, would have suggested a predetermined set of relationships between certain variables, which would then most likely have been rationalized by the interviewee. In other words, the interviewee would then have been prompted to perceive two variables in a particular relationship, which might not have been the true opinion of the interviewee. Such guidance from the interviewer could possibly have suppressed the spontaneous and natural thoughts of interviewees relating to the topic discussed, which would have negated the purpose of the semi-structured interviews. As a result, interviewees were provided with considerable freedom on how to respond to the topics introduced during the course of the interview, either discussing that topic isolation, or in relation to any other topic. The interviewees were also allowed to discuss topics related to the research that were not specifically listed in the interview guide. Questions were not asked in strict sequential order and some questions were asked that were not included in the interview guide.

Each interview was started by presenting a summary of the initial results of the quantitative research to each interviewee, which included an indication of how the participating company performed relative to the average in respect of the consolidation system. An interview guide was then used to ensure that a number of specific topics were covered during the interview, and also to provide some assurance that interviews were conducted in a consistent and systematic manner. The topics introduced during the interviews corresponded broadly to the variables contained in the research model. For example, the first item on the interview guide required the interviewee to provide

an explanation of the entire year-end process, which would naturally have included the consolidation phase. During the discussion of the year-end process, the interviewee would have been questioned regarding the number of days that were required to complete each year-end phase. One of the notable advantages of the semi-structured interview, when compared to the questionnaire as a data collection method, was that the interviewee explained why each year-end phase required a certain number of days to complete. As such, the semi-structured interviews provided context to much of the data collected by means of the questionnaire, thereby enhancing the understanding of the actual design and use of consolidation systems.

The interview guide and an example of the initial results of the quantitative research that was presented to one of the interviewees have been included in Appendix C. It was explained to interviewees that a) their participation was voluntary; b) they will remain anonymous; and c) all information revealed will be treated confidentially. All interviews were recorded with the agreement of interviewees and were subsequently transcribed in order to facilitate the analysis. The qualitative analysis techniques that were used and the results that were obtained have been delineated in Chapter 6 of this thesis.

4.4 Development of Latent Variables

Many constructs of interest to social scientists, such as preferences, attitudes and personality traits, cannot be observed directly. Latent variables, as opposed to observable variables, are variables that are not directly observed, but are measured indirectly (deduced) by means of mathematical models from other variables that are observed and directly measured. Such latent variables are normally measured by means of observable indicators, such as questionnaire items designed to elicit responses related to that particular variable. The three latent variables developed as part of this research attempted to measure the consolidation system's level of sophistication, formalisation and integration (refer to section 3.5). The construct validity of the latent

variables was assessed by means of a confirmatory factor analysis (refer to section 5.3.1). The purpose of this section is to provide an explanation of the process that was followed to determine the questionnaire items that were used to calculate the three latent variables contained in the research model.

Ideally, previously conducted academic research on consolidation systems would have been used as a basis to determine the questionnaire items that should be used to calculate the latent variables. However, the lack of academic articles that specifically considered consolidation systems prevented the researcher from using previous studies as a basis for the development of the latent variables. An alternative approach could have been to use and adapt latent variables that were developed as part of academic studies that considered other types of accounting information systems. The level of sophistication, integration and formalisation of management accounting systems has been developed, used and refined by various academic studies (Burns and Waterhouse 1975; Waterhouse and Tiessen 1978; Merchant 1981; Sharma 2002; Chenhall 2003). However, the characteristics and functions of management accounting systems vary to such an extent from consolidation systems that it was not feasible to apply the questionnaire items that were developed in the context of management accounting systems, to this research. It was therefore necessary to develop an entirely new set of questionnaire items in order to calculate the latent variables. The validity of the research was dependent on the selection of the most appropriate questionnaire items.

The first step in developing a list of questionnaire items required the use of the researcher's knowledge of consolidation systems by listing the features or functions of the system that would be considered sophisticated, integrated and formalised. For example, the researcher was of the opinion that the automatic calculation of the values that are contained in the consolidated Cash Flow statement would be regarded as a sophisticated feature. In a similar manner, many other features or functions of the consolidation system were identified that could be attributed to one of the system characteristics: sophistication; integration; formalisation. This list of consolidation system features or functions, grouped according to consolidation system characteristics,

were then presented to other practitioners. These practitioners were asked to validate the consolidation system features or functions included on the list, and also to suggest other items that should be added. It is important to emphasise that the process of developing this list of appropriate consolidation system features or functions was iterative, since the proposed list was repeatedly altered on the basis of feedback received. Four practitioners, independent of the research, were consulted during this development process, which resulted in a list of consolidation system features or functions that was, in the opinion of the researcher, valid and sufficiently reviewed in order to provide a dependable basis for the calculation of the latent variables.

Once a final list of consolidation system features or functions was specified, questionnaire items were created in relation to each item. For example, continuing with the example mentioned above, the following statement was created: The consolidation system automatically calculates all the values that are contained in the consolidated Cash Flow statement. During the process of completing the questionnaire, participants would then indicate whether they strongly disagree; disagree; are neutral or don't know; agree; or strongly agree with that statement. Each questionnaire item would then be allocated a score on the basis of the response obtained, which would then be combined with other item scores and used to calculate the value of the respective latent variable. The questionnaire items that were developed on the basis of the list of consolidation system features or functions were reviewed and amended during the two sets of pilot studies that were conducted (refer to section 4.3.1).

4.5 Sampling

Sampling is a process that is concerned with the selection of individual observations intended to provide some understanding about the properties or characteristics of a population in order to enable statistical inference (Sekaran 2003). The generalisability of the research findings (external validity) is a preoccupation of quantitative researchers. This preoccupation is revealed in the level of attention accorded to the

question of how data in respect of a representative sample can be collected. Weill and Olson (1989) criticise contingency studies that make use of cross-sectional survey methodologies for their low statistical power due to the small samples. It was therefore imperative that this research obtained a sample that was of a sufficient size and representative of the population of companies to which generalisations were made. Furthermore, Otley (1980) highlighted the need for a representative sample in contingency studies by emphasising the need for the thoughtful selection of the sample to provide a range of values on the selected contingent variables.

4.5.1   Sample Size

It is important to note that this study will focus on the performance of the organisational sub-unit that is responsible for the consolidation of listed companies only. Listed companies are normally structured as a listed holding company that owns interests in a number of associates, joint ventures and subsidiaries, which therefore necessitates the preparation of consolidated financial statements. Such a group structure makes it more likely that the holding company would make use of consolidation software in order to facilitate the preparation of consolidated financial statements. Stakeholders of all companies would prefer financial information to be made available soon after the financial year-end. However, it is generally the case that listed companies are placed under somewhat greater pressure to produce financial statements rapidly. One of the reasons that might explain the comparatively reduced level of pressure that is exerted on unlisted companies to officially report financial results could be that shareholders of these companies are often also executives and/or directors. These shareholders/executives/directors would have access to monthly internal management reports and also the preliminary year-end results prior to its completion, resulting in less pressure for the rapid release of the final version of the financial statements. Conversely, the vast majority of the shareholders of listed companies would not be directors of these companies. Such shareholders – in addition to the financial press, analysts and fund managers – who are forced to wait for the official release of the

consolidated financial statements, would naturally be eager for the financial results to be made available soon after the year end because they do not have access to other financial information. This discrepancy in the extent of pressure experienced by listed versus unlisted companies to perform a fast close at year-end, would make a direct comparison of the period to complete financial statements at year-end between listed and unlisted companies invalid. In other words, the relatively limited pressure exerted on unlisted companies to rapidly complete the financial statements at year-end would mean that the actual period taken by these companies to complete the financial year-end process is unlikely to be a valid indication of the consolidation system's true ability to facilitate a fast close.

It was therefore decided to focus the research on listed companies since they normally experience pressure to make the consolidated financial results available soon after year-end. The population in respect of this research could therefore be defined as all listed South African companies that perform a consolidation in order to comply with IFRS3. The sampling frame, being the listing of units in the population from which the sample will be selected, will be those companies that are listed on the Johannesburg Securities Exchange (JSE). The exchange is the 19th largest in the world measured by market capitalisation. The "Profile's Stock Exchange Handbook" (Oldert 2008) was used to compile the database of JSE listed companies. This handbook included financial and non-financial information relating to all the 402 companies that were listed at the time of publication.

Companies listed on the JSE were judged to be an appropriate sampling frame because:
   a) The South African Institute of Chartered Accountants (SAICA) provided an endorsement of the research in the form of a letter, which has been included in Appendix D. This letter was converted into an Adobe Acrobat document and attached to the e-mail sent to potential respondents. Many accountants of the listed companies to which the questionnaire was sent, are members of SAICA. An endorsement from the institute provided the research with the necessary perception of authenticity. It appeared that the enhanced perception of

authenticity resulted in greater access to the potential respondents, causing an improvement in the questionnaire response rate.

b) Databases that contain the contact details and the summary financial information of listed companies were readily available which enabled potential respondents to be contacted and the value of some independent variables to be calculated.

c) Companies listed on the JSE operate in a wide range of industries that are representative of the South African economy in particular, and developing economies in general. A convincing argument can also be made that the research findings could be generalisable to the design and use of consolidation systems in developed economies. International Financial Reporting Standards (IFRS) force companies that report in countries that have adopted IFRS, to produce the financial statements in a comparable format based on the same set of accounting principles and rules. The uniform format of financial statements causes the manner in which consolidation systems are designed and used not to vary significantly from one geographic region to another. Nevertheless, it should be accepted that any generalisations beyond the South African (or developing country) context could be problematic and should be done thoughtfully.

d) The market share enjoyed by consolidation systems will certainly vary from country to country, but the range of consolidation systems that are used by South African companies is similar to those used in developed economies. In fact, one South African banking group recently became the largest worldwide user of Oracle-HFM – currently one of the most popular consolidation systems. Another factor that contributes to the consistent design and use of these systems is the relative free movement of skilled labour. It is not uncommon for accountants to be introduced to a consolidation system in one country and when that person migrates to another country, either temporarily or permanently, for example, due to a shortage of skills, he/she transfers those skills and usage patterns acquired in the originating country to the destination country. The standardized training courses offered by the software companies that develop

general ledgers, ERP systems and specialised consolidation systems, results in the attendees of such courses to acquire similar usage patterns. Such consistent usage patterns are expected to contribute towards a more uniform design of these systems.

The relatively small number of companies in the population has resulted in the population being exactly similar to the sampling frame. The sample that will be used in this research will be a probability sample since all companies in the population have an equal chance of being included in the sample.

An important characteristic of a probability sample is that each subject should be selected independently of other subjects (McCall 1986). The selection of any company for participation in the research was entirely independent from the selection of any other company, but depended purely on it being listed on the JSE. However, 20 companies in the sampling frame formed part of a group of companies where more than one company is listed on the JSE. For example, listed company A might own 60% of listed company B. It is normally the case that in such circumstances, the consolidated financial statements of both companies A and B will be prepared by the same consolidation accountants, on the same consolidation system, employing similar processes and procedures. In such a situation, the questionnaire was sent to only one of the two listed companies. If both these companies were included in the sample, it would have resulted in the inclusion of subjects that were not entirely independent of each other. Such a group structure resulted in a reduction of the selectable research sample size by 10 companies.

In addition, when potential participants were approached and asked to complete the questionnaire, it was found that 6 companies that were included in the "Profile's Stock Exchange Handbook" (Oldert 2008), either de-listed from the JSE or merged with other listed companies subsequent to the publication of the handbook.

An important variable in the research was the size of the company. Size was measured by means of the turnover of the listed company. The reported turnover of each participant was obtained from the "Profile's Stock Exchange Handbook" (Oldert 2008). However, 20 listed companies did not publicly report turnover or reported turnover in a hyper-inflationary currency for which a reliable exchange rate was not available. These companies were not included in the final sampling frame because one of the independent variables could not be determined with an adequate degree of reliability.

The above mentioned issues resulted in the final number of subjects that constituted the sampling frame to amount to 366 companies. Upon the completion of the quantitative data collection phase of this research, 210 useable questionnaires were received from participants, resulting in a response rate of 57%. This response rate was considered to be acceptable, particularly in the light of Sharma's (2002) opinion that a response rate of 53% should be considered high for both contingency and conventional survey research.

4.5.2   Non-Response

A number of companies in the sampling frame refused to participate in the research or were not contactable. Such non-participation could result in a non-sampling error where differences between the population and sample arise. Non-participation is a potential concern because it could be possible that companies that agree to participate in the research may differ substantially from those who failed to participate. This selection bias could cast doubt on the generalisabilty of the findings. However, the probability of a non-response bias occurring could be reduced by increasing the response rate. Significant efforts were made to increase the response rate – foremost being the telephonic contact of every company in the sampling frame in order to explain the purpose of the research; what is required of each participant; and the potential benefits of the research. Questionnaires were therefore not merely blindly sent to potential participants, but were specifically addressed to the most appropriate

individual at each company. A review of recent contingency studies that made use of surveys, which were published in the journal "Accounting, Organizations and Society", revealed response rates of 47% (Naranjo-Gil and Hartmann 2007), 49% (Cadez and Guilding 2008) and 82% (Gerdin 2005). It is considered that the 57% response rate achieved by this research effectively reduced the risk of a non-response bias from occurring to an acceptably low level. While the relatively high response rate suggests that non-response bias should not be a source of concern, it has to be acknowledged that accountants in companies with relatively sophisticated accounting systems may have been more inclined to respond to the questionnaire than companies with less sophisticated accounting systems (Cadez and Guilding 2008).

4.6 Validity

Limited confidence can be placed in the findings of a study if opportunities for the introduction of biases in the collection of empirical data are not minimised. Validity is essentially concerned with the integrity of the conclusions that are generated from research (Bryman and Bell 2003). The three criteria that are generally used to assess the validity of research with a positivistic epistemological approach are construct validity; internal validity; and external validity.

4.6.1   Construct Validity

This research made use of a self-completion questionnaire to collect data relating to certain characteristics of organisations and their consolidation systems. These abstract characteristics (latent variables) have to be measured by means of imperfect observable proxies. The question is not whether perfect proxies could be devised, but rather whether adequate attempts were made to reduce measurement error and bias. The use of imperfect proxies has the potential to lead to either a failure to identify valid relationships between variables, or the detection of relationships that are in truth

spurious. It should therefore be considered whether the questions that were asked (i.e. the measuring instrument), did measure the intended concepts and not something else. Construct validity (sometimes referred to as measurement validity) considers the extent to which the constructs (latent variables) of theoretical interest are successfully operationalised in the research (Abernethy, Chau et al. 1999). Highly valid theoretical constructs should enhance their ability to test the theoretical model.

Certain variables of this research model, such as the extent of the company decentralisation, size and the resources required to complete the consolidation, are proxied by means of 'hard' numbers. The proxies by which these variables are measured, number of companies in the group, group turnover, and the number of accountant days needed to close the financial statements at year-end respectively, are considered to be highly valid. For example, it would be highly improbable for a decentralised organisation to be organised in only a small number of reporting entities.

However, the abstract characteristics of the consolidation system, being the extent of its integration, formalisation and sophistication, will be measured by means of proxies that are considered to be less valid when compared to the highly valid constructs discussed in the preceding paragraph. A number of items in the questionnaire will attempt to gauge the perception of the user in relation to each of the characteristics of the consolidation system mentioned above. One consideration that should enhance the construct validity of this research is that the integration, formalisation and sophistication constructs are fairly narrowly defined and are therefore not easily confused with other aspects of the consolidation system. Abernethy, Chau et al. (1999) argue that, from a construct validity point of view, it is preferable to operationalise more restrictive constructs since it is generally more difficult to establish validity for excessively broadly defined constructs.

Bryman and Bell (2003) argue that, to a limited extent, the validity of a construct can be confirmed by establishing face validity – that is, the measure apparently reflects the content of the construct. This research project attempted to establish face validity by

consulting with other practitioners during the first phase of the pilot study to determine whether the items relating to integration, formalisation and sophistication that were included in the questionnaire, do represent the respective constructs. Useful feedback was obtained and certain recommendations were adopted to improve construct validity.

Factor analysis is a commonly used method by which construct validity could be assessed (Dawis 1987). This research established construct validity principally by means of a confirmatory factor analysis. A detailed discussion of the application of confirmatory factor analysis has been included in section 5.3.1.

4.6.2   Internal Validity

Internal validity refers to the confidence that is placed in the causal relationships among variables (Sekaran 2003). While the internal validity of laboratory experiments is normally high, it is not possible to verify the internal validity in survey research because all the variables are measured simultaneously. While certain theoretical arguments could be offered in support of a particular direction of causality, survey research cannot rule out an alternative explanation of the research results, where, for example, unobserved variables might explain the observed results. However, Abernethy, Chau et al. (1999) argue that cross-sectional studies could achieve some level of internal validity when strong correlations among variables are found to exist and if an alternative direction of causality is implausible. It should be emphasised that this research does not attempt to prove the direction of causality, but only whether a relationship exists between certain contingency factors, the characteristics of the consolidation system and the ability of the organisational to rapidly complete the consolidation.

The proposed theoretical model makes it abundantly clear that the most likely direction of causality would be from the independent variable to the mediating and the dependent variables. It is unlikely, but not impossible, that the direction of causality could operate

in the opposite direction. For example, the research model argues that if decentralised companies make use of sophisticated consolidation systems, the consolidation should be completed in a relatively short period of time. The opposite direction of causality would be that a company has decided to perform a fast close, which necessitated the acquisition of a sophisticated consolidation system, which in turn encouraged the company to organise itself in a more decentralised structure. This alternative explanation is highly improbable, but not impossible. A more likely threat to the internal validity of cross sectional research is that other unmeasured variables may co-vary with the variables that are included in the research model. In reality, it is not possible to completely rule out the impact of these other unmeasured variables in cross-sectional research. Instead, theoretical arguments have to be relied upon to convince the reader that the independent variable is the most likely determinant of the dependent variable.

4.6.3   External Validity

External validity is concerned with the question of whether the results of a study can be generalised beyond the specific research context (Bryman and Bell 2003). The expectation was that this research project should be generalisable, to some extent, across different populations, environments and times. Survey based research, as opposed to experimental studies, has the potential to achieve high levels of external validity. The most important factor that influences the external validity of research is the representativeness of the sample. The sampling section of this chapter delineated the issues that were considered in relation to the selection of a sample from which generalisations could be made.

4.6.4   Practitioner Response

Upon completion of the data collection and analysis phases of this research, the results were presented to a group of 85 research participants and members of the South African

Institute of Chartered Accountants. At the conclusion of the lecture, attendees were asked to complete an anonymous evaluation form. The feedback results will be discussed in greater detail in the final chapter (section 7.2.2), but one aspect of the feedback that is relevant to the validity of the research findings is the assessment by the attendees of presenter's subject knowledge. It is considered that the average score of **91%** obtained in connection with the presenter's subject knowledge provides a certain level of support for the validity of the research findings, since a degree of face validity is established by presenting research findings to and obtaining positive feedback from informed practitioners (Bryman and Bell 2003).

4.7 Data Analysis Techniques

The self-completion questionnaire collected data that could be used in both inferential and descriptive statistical analysis. The calculation of descriptive statistics involved the ordering and manipulation of the data to provide information that describes the manner in which consolidation systems are designed and used. The descriptive statistics that were calculated include frequencies, measures of central tendency and dispersion. A detailed discussion of the descriptive statistical analysis has been included in section 5.2.

Quantitative research is rarely satisfied with a mere description of a phenomenon, but is much more interested with an explanation, which means the examination of the causes. The notion of independent and dependent variables reflects a tendency to consider the phenomenon being examined in terms of causes and effects. However, cross-sectional research, where data regarding variables are collected simultaneously, allows for the testing of relationships between variables only. The existence of a relationship does not allow for a conclusion to be reached regarding the direction of causality. Nevertheless, some arguments could be presented regarding the likely direction of causality but no firm conclusion could be reached in a cross-sectional study.

4.7.1 Pearson Correlation

The minimum requirements of a contingency study according to Otley (1980) consists of a) the identification of specific aspects of an accounting system; b) that are associated with certain defined circumstances; c) and the demonstration of an appropriate matching. The Pearson correlation coefficient is a common measure of the strength and direction of a linear relationship between two variables, resulting in a value between +1 and -1 inclusive. The Pearson correlation coefficient is appropriate for interval-scaled (such as Likert scaled) variables (Sekaran 2003). The Pearson correlation coefficient will be used to test the hypotheses that have been proposed in Chapter 3, which considers the second part of Otley's minimum requirements for contingency theory of accounting: an association between the defined circumstances and aspects of the accounting system. The results of this analysis have been presented in section 5.3.2.

4.7.2 Structural Equation Modeling

This section deals specifically with the latter part of Otley's requirement for a valid contingency theory of accounting: the demonstration of an appropriate matching. Venkatraman (1989) argues that the role of fit in contingency type research has been severely handicapped by the absence of appropriate links between the theoretical concept of fit and the statistical techniques that are used to test the constituting relationships. This point is further emphasised by his assertion that a major contributor towards inconsistent research results could be a lack of correspondence between the concept of fit and the statistical techniques that are used test for its existence. Hartmann and Moers (1999) pointed out that Otley does not show how an appropriate matching should be defined theoretically, nor does he prescribe how it should be determined empirically. However, Hartmann and Moers do state that prescriptions for the establishment of an appropriate matching can be found in organisational literature which has a significant longer history in contingency theory. Furthermore, the 1999

article and subsequent article (2003) by these two authors provide an in depth investigation of appropriate statistical analysis techniques for use in contingency studies.

Various contingency researchers recommend the use of Structural Equation Modeling (SEM) as the ideal statistical technique for the analysis of a mediated relationship between dependent and independent variables (Sharma 2002; Chenhall 2003; Cadez and Guilding 2008). One of the reasons for the pervasive use of SEM in many scientific fields is that it provides researchers with a comprehensive method for the quantification and evaluation of substantive theories (Raykov and Marcoulides 2006). Chenhall (2003) argue that SEM are used to construct latent variables from multi-item questionnaires and to identify, simultaneously, statistical significance with multiple dependent variables (Shields, Deng et al. 2000). However, this technique is often not used due to the fairly large sample size (recommended minimum of 100) that is required to for a reliable analysis. SEM developed out of and serves purposes similar to that of multiple regression, but it is more powerful since it considers the interactions between variables, nonlinearities, correlated independents, measurement error, and several latent independent variables each measured by multiple indicators (Raykov and Marcoulides 2006). SEM supports confirmatory rather than exploratory modeling; thus, it is more appropriate for theory testing (deductive research) rather than the development of theory (inductive research) and as such, is ideally suited for the purposes of this research. The formulation of a SEM normally starts with the development of a number of hypotheses; which is then represented as a model; the constructs of interest is then operationalised with a measurement instrument, which was developed by means of a confirmatory factor analysis; and finally the model is tested. A detailed explanation of the process that was followed during the development of the SEM and the results of the analysis has been presented in the Quantitative Research Results chapter.

4.8 Criticisms of Contingency Theory

A number of the criticisms that are most often directed towards contingency theory have been discussed in the literature review chapter (Chapter 2) of this dissertation. Some of these criticisms are serious and have the potential to devalue studies that adopt such a theoretical framework. These criticisms have to be considered thoroughly and it should be determined how the application of contingency theory research could be changed to improve its acceptability to academics and practitioners. The following section will attempt to explain how the researcher reflected on the criticisms of contingency theory and, where possible, made necessary changes to the research design in order to reduce their negative impact.

Amongst many other writers, Otley (1980) and Weill and Olson (1989) criticise contingency theory for the small variation in the organisational performance that is attributable to the contingency variables. This is a valid criticism which regrettably has to be accepted as a limitation of contingency type studies because the forces that influence organisational performance are, in reality, numerous, complex and diverse. To consider all the possible influences on the financial performance of an organisation as a whole in an academic study would be unworkable. However, one possible solution would be to select a measure of performance of the organisational sub-system that is more closely associated with the contingency variables under consideration and less open to other influences. This research has adopted this approach by selecting the resources that are required to complete the consolidation as the principal measure of performance of the consolidation system. Even though it could be argued that the resources that are required to complete the consolidation are influenced by fewer factors than the financial performance of the organisation as a whole, it has to be accepted that the consolidation system is by no means the only factor that would influence the resources that are required to complete the consolidation. Other factors that could also influence this measure include, amongst others, the level of training and experience of staff; the extent to which accounting processes and procedures are

standardised across the group; the level of senior manager support for a fast close at reporting periods; and the degree of staff motivation. The inclusion of some or all of these other factors would render this study excessively broad and non-viable. However, it is considered that, as a measure of performance, the resources that are required to complete the consolidation is significantly more closely associated with consolidation system, than the performance of the organisation as a whole would have been as a measure of performance.

Weill and Olson (1989) criticise contingency theory for being deterministic, while Longenecker and Pringle (1978) claim that inadequate attention is devoted to the relationship amongst variables. Both criticisms relate to the tendency of contingency studies to ignore the richness and complexity of the social sciences by concentrating on the statistical relationship between variables and to simply conclude with listing of the possible contingency variables. These criticisms could conceivably be directed towards any research that adopts a quantitative methodology. The researcher is acutely aware of this limitation of quantitative research. A specific attempt was made to counter this criticism by including some qualitative research in the research design. It is the opinion of the researcher that the semi-structured interviews provided added insight into the relationship between the variables in the research model and provided a richer and more complete picture of the functioning of consolidation systems in practice.

Weill and Olson (1989) also criticise some contingency theory studies, such as Child (1973), for the inferences that were made from small sample sizes. This research project directed significant efforts towards obtaining a sufficiently high response rate, specifically in order to improve the reliability of the research findings and to counter any criticisms relating to a small sample size.

Contingency theory is also criticised for its lack of clearly defined independent variables and for the lack of consistent definitions of independent variables that are used by different studies. This research project does not attempt, nor is it able to correct the variations in the definitions of the independent variables. However, it can

endeavour not to add further to the diversity of the definitions of the independent contingency variables. With this aim in mind, the definition of contingency variables delineated in the theoretical framework proposed by Thomas (1991), have been accepted and incorporated into the research. While some independent variables, such as the user characteristics, were excluded from this research, the definition of those variables that were included, were accepted without any alternation.

4.9 Ethical Considerations

Ethics in business research refers to a code of conduct that should influence each step of the research process: data collection, data analysis, reporting and dissemination of the findings (Sekaran 2003). Of central importance is the ethics of the person who institutes the research and the person who conducts the actual research. In this research project, the former and the latter persons was the same. Diener and Crandall (1978) propose that ethical social research should ensure that a) participants are not harmed; b) informed consent is obtained; c) privacy is not invaded; and d) deception is not involved. The ethical issues that were encountered during each stage of the research process and the action that was taken to prevent any ethical objections will be discussed in the following sections.

4.9.1   Data Collection

Informed consent is one of the fundamental principles of ethical research. This principle requires that prospective participants should be provided with as much information as might be necessary in order to make an informed decision about whether or not to participate in the research. Potential respondents that are responsible for the consolidation system of the companies in the sampling frame was contacted and asked to complete the questionnaire. The objective of the research and the purposes for which the data was collected was explained at this stage. It was emphasised that the data will

not be used for commercial purposes. The e-mail to which the questionnaire was attached also provided some details that enabled potential participants to make an informed decision regarding participation. This e-mail has been included as part of Appendix A.

The principle of voluntary participation requires that potential participants should not be placed under the impression that they are required to participate in the research. Potential participants were informed that they were at liberty to refuse participation and to withdraw the data supplied in the questionnaire at any stage of the research process. The South African Institute of Chartered Accountants (SAICA) was approached in order to obtain their support this research project. SAICA provided an introductory letter of support which was converted to an Adobe Acrobat document and e-mailed to potential participants in order to reassure them that this research was bona-fide. A risk existed that potential recipients could wrongly have interpreted the letter to mean that they were placed under some form of obligation to complete the questionnaire, particularly if the person was a member of SAICA. It was therefore emphasised that the letter from SAICA did not place its recipients under any obligation to complete the questionnaire and that participation was entirely voluntary. This letter has been included in Appendix D. It was expected that the emphasis on voluntary participation in both the letter from SAICA and the e-mail accompanying the questionnaire, would have been adequate to reassure potential participants that they are under no compulsion to participate.

This research was not concerned with the identities of individual corporate entities. Potential participants were informed that the data they supplied in the questionnaire would be treated confidentially and that any reporting of the research results would be done in an anonymous manner. Upon receipt of the completed questionnaires, the data was transferred to the database from where the analysis was performed. The confidentiality of the data supplied was maintained by ensuring that this database was stored in a secure environment that was not accessible to unauthorised persons. Access to the database was controlled by means of a password. In addition, the database was

stored on the personal computer of the researcher which was not in a network environment, thereby further limiting the risk of unauthorised access to the data. The database was backed-up at regular intervals to prevent the accidental loss of the data.

Fabrication, in relation to academic research, refers to the intentional falsification of research results. This form of behaviour is considered to be highly unethical. Behaviour that constitutes fabrication would include, amongst others, the manipulation of data that has been collected or the inappropriate removal of data that contradicts the hypotheses. Ethical researchers should accept the data that has been collected in an objective manner and analyse it dispassionately, thus refraining from any attempt to manipulate the data in order to support a predetermined conclusion.

4.9.2   Data Analysis

The ethical guidelines of the Social Research Association (2003) states that if social research is to remain of benefit to society, then social researchers must conduct their work responsibly and in accordance with the moral and legal order of the society in which they operate. The guidelines continue by stating that the obligation social researchers have towards society should be expressed in the maintenance of high scientific standards in the methods employed in the collection and analysis of data and the impartial assessment and reporting of findings. Of particular importance is that researchers should uphold their professional integrity by selecting analytical methods on the basis of merit. The selection of an analytical method solely on the basis of the favourable results that will be produced is regarded as unethical behaviour. This research project made use of analytical methods that have been used repeatedly in previous contingency studies and are generally accepted to be appropriate for this type of research. The application of these analytical methods was done objectively and no attempts were made to reach conclusions that were not supported by the data, even if such conclusions might have resulted in a higher profile for the research project.

4.9.3   Reporting and Dissemination of Findings

The reporting and dissemination of the research findings is an important part of the research process. The submission of the research report for collegial review is essential to the maintenance of high academic standards and ethical behaviour. Researchers have a responsibility to preserve impartiality in the assessment of the data collected and the truthful and unbiased reporting of the findings. Truthful reporting means that the research results should not be presented with the intention to mislead. All attempts were made to present the results of this research project objectively and in a dispassionate manner with the intention to advance knowledge.

One of the principles of ethical research is that the results of research should be reported anonymously, which means that the report should be presented in such a manner that it is not possible to identify any participating company.   Bryman and Bell (2003) point out that quantitative research makes it easier to anonymize records and report findings. It is often found in qualitative research that despite the removal of the names of respondents from research reports, smaller sample sizes enable the identity of research participants to be deduced by means of other information being provided. The sample size of this research project has been sufficiently large to avoid the identification of companies by means of deduction. All reports emanating from this research did not contain the names of any respondents and was reported in a manner that prevented the identity of the respondents to be deduced.

4.9.4   Data Protection Act

The Data Protection Act passed in the United Kingdom in 1998 protects the privacy of personal data of any living individual. The Data Protection Act does not apply to the data collected and analysed as part of this research since the act is solely concerned with data that relates to living individuals and therefore not corporate entities. The act states that personal data should: a) be processed fairly; b) be obtained for a lawful

purpose and not processed in any manner that is incompatible with that purpose; c) be adequate, relevant and not excessive; d) be accurate and kept up to date; and e) not be retained longer than necessary. The act also states that appropriate technical measures should be taken to protect the data that has been collected against unlawful processing and accidental loss or destruction.

Even though the act does not apply to the data collected as part of this research, the principles contained in the act are sound and provided a useful guide to good practice of the collection, processing and storage of data. The application of the Data Protection Act to data that has been collected as part of this research project – even though not required by law – stipulated that the data should: a) not be used for purposes other than the academic research; b) not be in excess to that which is strictly necessary for this research; c) be securely stored; and d) properly backed-up to prevent accidental loss or destruction.

Chapter 5: Quantitative Research Results

5.1 Introduction

It was mentioned in the Methodology chapter that the main purpose of the questionnaire was the collection of inferential statistics, but that a number of questions were included with the specific purpose of collecting descriptive statistics relating to consolidation systems. Inferential statistical analysis is a necessary element of deductive research, without which the research would lack rigour. While descriptive statistics do not allow the researcher to make inferences from the sample to the population, it does provide information regarding the phenomenon. The information revealed by means of descriptive statistical analysis is particularly valuable since any recent data relating to consolidation systems in this particular field apparently do not exist. The first section of this chapter deals with the descriptive statistics that have been collected and analysed as part of this research. The second section explains the inferential statistical methods that were applied and results that were obtained.

5.2 Descriptive Statistical Analysis

McCall (1986) defines descriptive statistics as the procedures for organising, summarising and describing quantitative information or data. One of the principal benefits of descriptive statistical analysis in this research is that it contributes greatly to the relevance of the research findings to practitioners: While it is expected that practitioners are not indifferent to the existence of statistically significant relationships between some of the variables in the research model, they would be much more interested in descriptive information, such as the proportion of listed organisations that make exclusive use of spreadsheets to perform the consolidation.

5.2.1　　　Application Type Grouping

In the section titled "Terminology" of Chapter 1 of this thesis, the term consolidation system was explained. It is worth repeating that the consolidation *application* is a part of the consolidation *system,* the latter being a broader term that refers to a collection of applications that facilitate the consolidation process. It could be that the consolidation application consists of the entire consolidation system. However, in some instances, the consolidation application relies on other elements of the consolidation system, such as a database and/or a reporting application, in order to complete the consolidation process.

Due to the apparent lack of publicised academic research in the specific area of consolidation systems, no existing grouping of consolidation applications could be found in the academic literature. However, in a trade publication, Newing (1996) refers to the following three groups of consolidation applications: specialist *consolidation* systems; bespoke systems; and ledgers, spreadsheets or decision support systems. The consolidation solutions that were popular at the time of this research, did not seem to fit into the grouping devised by Newing (1996). As a result, the following three groups of consolidation applications were devised:

1. Spreadsheets and customised databases. Hereafter referred to as spreadsheets.
2. Consolidation modules that form an integral part of the General Ledger (GL) or Enterprise Resource Planning (ERP) application of the listed holding company, hereafter simply referred to as GL/EPR modules.
3. Specialised consolidation applications.

This new consolidation application type grouping was discussed with and validated by a number of practitioners. These practitioners agreed that this classification system managed to classify consolidation applications into meaningful groups that would

facilitate analysis. The following list of consolidation applications, grouped into the type of application, was compiled from the data supplied by the research participants:

1. Spreadsheets and customised databases: Essbase; Lotus 123; MS Excel; MS Access.
2. GL/ERP Modules: Accpac; Great Plains; MPC; Oracle; Pastel; SAP
3. Specialised consolidation applications: Caseware; Cognos; FDC; Hyperion Financial Management; Hyperion Enterprise; Outlooksoft.

It emerged clearly from both the qualitative and quantitative analysis that spreadsheets were used, almost universally, by accountants as an integral part of the process to prepare the consolidated financial statements of listed organisations. However, the extent of reliance on spreadsheets during the consolidation process varies considerably. Participants were required to specify what application was used during the consolidation of financial statements during the most recent year-end. It was found that participants who indicated that their principal consolidation application was either a specialised consolidation application or a GL/ERP module, also relied on spreadsheets to complement their principal consolidation application. In such cases, spreadsheets facilitated a range of other consolidation functions such as the creation of management reports, reconciliation of inter-group transactions, the collection of additional disclosure information and the drafting of the annual financial statements.

Spreadsheets were used by 62% of participants as their principal application. GL/ERP modules were used by 18% of participants, while 20% made use of specialised consolidation applications to consolidate the financial statements (Figure 5.1). The relatively high percentage of organisations that relied exclusively on spreadsheets during the consolidation process was unexpected. This figure is particularly surprising when compared to the results of a somewhat dated survey of a sample of American organisations (Newing 1996), during which it emerged that merely 6% of respondents made exclusive use of spreadsheets to consolidate the financial statements, while 54% used specialist consolidation systems. The article, in which the results of Newing's

(1996) survey were published, unfortunately did not provide any information regarding the size and the representativeness of the sample, nor the profile of participating organisations – such as the organisation's turnover or the number of subsidiaries contained in the organisation. Consequently, it is difficult and possibly imprudent to make direct comparisons to or definite inferences from the results of the American survey. Nevertheless, it should be safe to conclude that the extent to which South African listed organisations rely on spreadsheets during the consolidation process is greater than that of American organisations.

Figure 5.1: Principal Consolidation Application Grouping
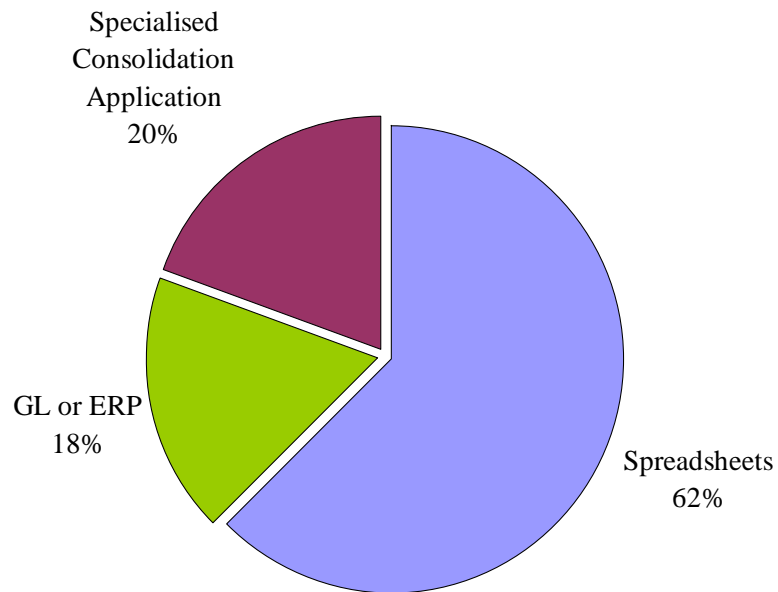
5.2.1.1 Organisation Turnover

Figure 5.2 presents the turnover of research participants according to the application type that was used during the consolidation process. The bars on the graph indicate the 10th to the 90th percentile range in reported organisation turnover, while the lines on the

bars indicate the mean. The graph reveal that the 90th percentile of turnover for organisations that use spreadsheets is R9.1 billion, while the turnover for GL/EPR modules and specialised consolidation applications is R40.3 billion and R59.3 billion respectively. It appears that listed organisations with a relatively small turnover tend to favour spreadsheets, while organisations with relatively larger turnover use either GL/ERP consolidation modules or specialised consolidation applications. This apparent trend should neither be interpreted that listed organisation with relatively large turnover make use of only specialised consolidation applications or GL/ERP modules; nor that organisations with relatively smaller turnover use spreadsheets exclusively.

Figure 5.2: Group Turnover by Consolidation Application Type

	Spreadsheets	GL or ERP	Specialised Consolidation Application
10th percentile	88	192	250
90th percentile	9,086	40,380	59,281
━ Mean	5,100	22,350	21,139
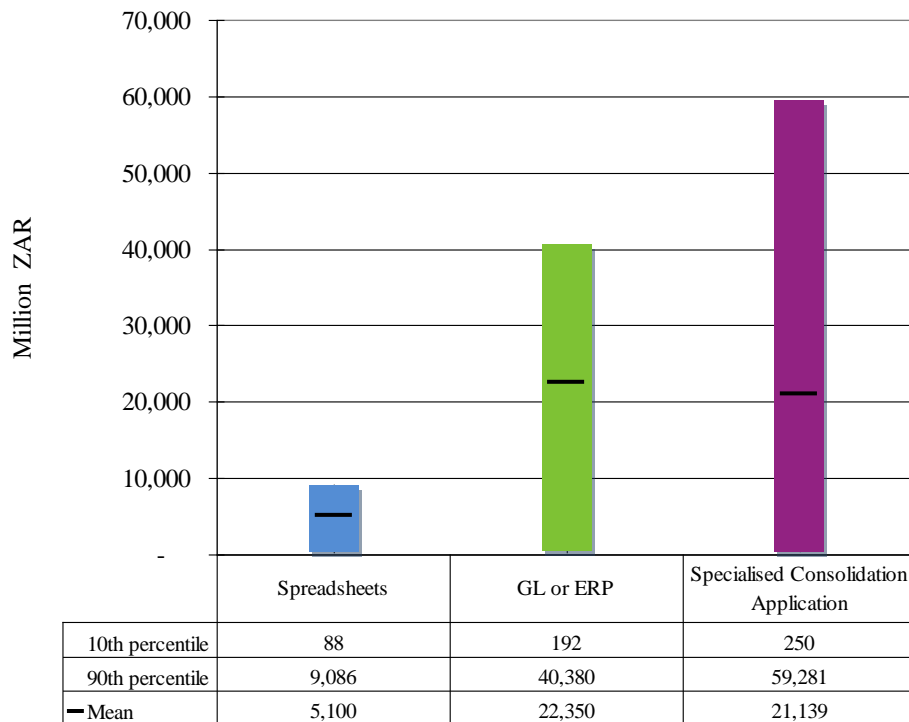
5.2.1.2 Decentralisation

An even clearer trend emerges when the extent of decentralisation in listed organisations is considered in terms of the type of consolidation applications that are used. Organisational decentralisation refers to the number of entities in which the listed organisation is organised. Figure 5.3 presents the number of entities in the listed organisation, categorised according to the principal consolidation application type. The graph indicates that the 90th percentile of the number of entities in the organisations that principally use spreadsheets is 69 entities, while the similar figure for GL/EPR modules and specialised consolidation applications types are 132 and 444 respectively. It should again be noted that Figure 5.3 must neither be interpreted that decentralised organisations make exclusive use of specialised consolidation applications, nor that more centralised organisations always make use of either spreadsheets or GL/ERP's during the consolidation process. For example, one participant that uses a collection of spreadsheets to perform the consolidation, completed the process successfully and in a comparitavely short period of time, despite having 250 entities in the organisation.

Figure 5.3: Decentralisation by Consolidation Application Type

	Spreadsheets	GL or ERP	Specialised Consolidation Application
10th percentile	5	5	10
90th percentile	69	132	444
· Mean	32.3	58.1	142.8
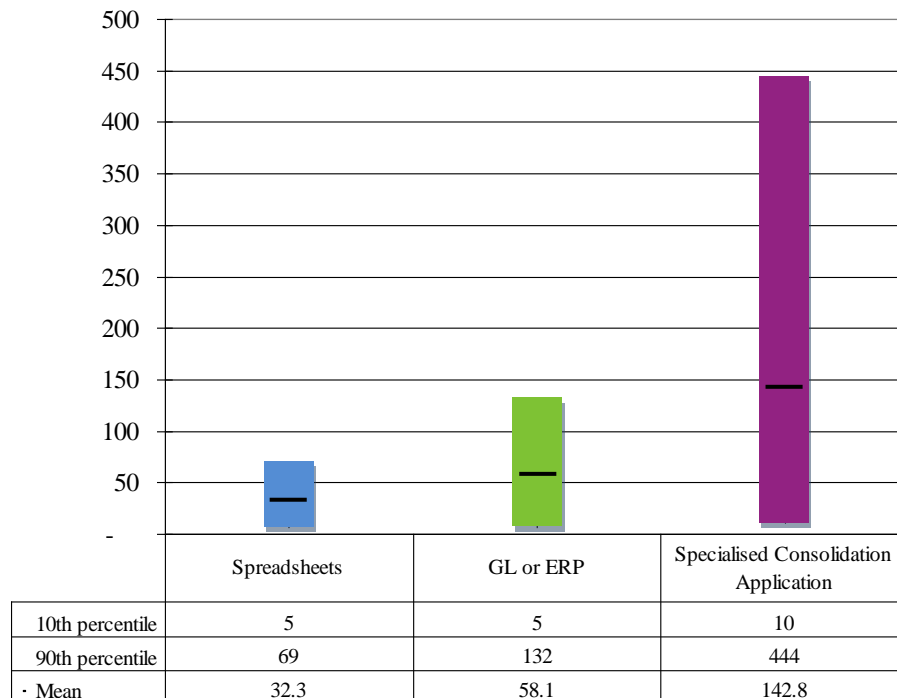
It was noted in the qualitative analysis chapter that all interviewees explained the appropriateness of the consolidation application in terms of the number of entities that are contained in the consolidation (decentralisation). Not one interviewee suggested that turnover should influence the decision regarding the type of consolidation application to be used. It is proposed that decentralisation is the real factor that influences the choice of consolidation application. The apparent relationship between organisational turnover and the consolidation application type (Figure 5.2) is merely as a result of a relationship between organisational turnover and decentralisation: organisations with a large turnover are often organised in a decentralised manner, while organisations with a small turnover are likely to be more centralised.

5.2.1.3 Sophistication

Sophistication refers to the extent to which the consolidation system *automates* a number of functions that are integral to the year-end consolidation process, such as the elimination of inter group transactions; and the automated validation of figures that are stored in the application. The questionnaire items that comprise the sophistication score were determined by means of confirmatory factor analysis, which is discussed in the inferential statistical analysis section of this chapter (refer to section 5.3). The score was calculated by summing the responses obtained from the relevant 5-point Likert items. The maximum score that could be achieved for sophistication was 30, indicating a very sophisticated consolidation application.

The coloured bars in Figure 5.4 represent the 10th to the 90th percentile of the sophistication scores obtained by listed organisations that made use of the different types of consolidation systems, while the lines on the bars indicate the mean score. The first point that should be noted is that a significant variation exists in the sophistication scores obtained by organisations that make use of the different types of consolidation systems. In other words, despite the potential of GL/ERP modules and specialised consolidation applications to obtain a high score on the sophistication scale, many

organisations that use such applications achieved a lower sophistication score than organisations that exclusively use spreadsheets during the consolidation process. However, it is evident that many organisations use the available functionality of GL/ERP modules and specialised consolidation applications to render such systems more sophisticated than spreadsheets.

The apparent failure of some organisations that use GL/ERP modules and specialised consolidation applications to fully utilise the sophisticated functionality of such applications could, in part, be attributed to the perceived tradeoff that exists between the system formalisation and sophistication, where a more formalised system will necessitate a somewhat lower level of sophistication. It was mentioned in the Qualitative Analysis chapter that the company 2 interviewee made a deliberate decision to reduce the sophistication of the consolidation system in order to enhance formalisation. It is interesting to note that company 2 obtained a very high formalisation score (23 out of a maximum of 25), which seems to support the claim that company 2 did endeavour to enhance the consolidation system's formalisation.

Figure 5.4: Sophistication by Consolidation Application

	Spreadsheets	GL or ERP	Specialised Consolidation Application
10th percentile	8	12	12
90th percentile	20	23	24
· Mean	13.9	17.2	18.4
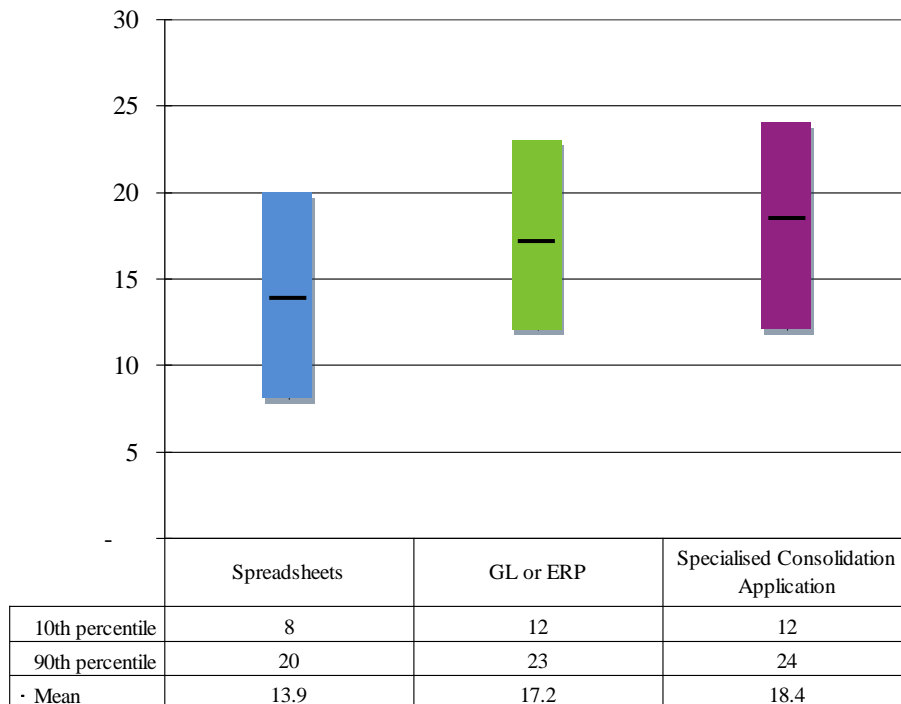
5.2.1.4 Integration

Integration refers to the extent of automated data transfer between the sources of the consolidation data (such as the GLs or the packs submitted by subsidiaries) and the consolidation application, and also the extent of automated data transfer from the consolidation application into reports (both management reports and the annual financial statements). The questionnaire items that comprise the integration score were determined by means of confirmatory factor analysis (refer to section 5.3). The score was calculated by summing the responses obtained from the relevant 5-point Likert items. The maximum integration score that could be achieved was 20, indicating a highly integrated consolidation application where very little data is manually entered into the system and also where the reports are automatically populated with the consolidated data.

The coloured bars in Figure 5.5 represent the 10th to the 90th percentile of the integration scores obtained by listed organisations that made use of the different types of consolidation systems. It is clear that, despite the large variations in scores obtained, organisations that use specialised consolidation applications are generally more integrated than their counterparts that use spreadsheets during the consolidation process. However, GL/ERP modules are used as the most integrated type of consolidation application. This trend could be expected since the consolidation module is an integral part of the GL/ERP. As such, data flow between elements of the GL/ERP would be automated, leading to limited manual data entry requirements. The integration of the consolidation system is important because it reduces the need for the menial re-entering of data and also because it diminishes the likelihood of errors taking place during the data transfer process due to human mistakes. Integration therefore contributes towards greater system efficiency and reliability of the system output.

Figure 5.5: Integration by Consolidation Application

	Spreadsheets	GL or ERP	Specialised Consolidation Application
10th percentile	6	9	9
90th percentile	14	17	16
· Mean	9.9	12.8	12.3
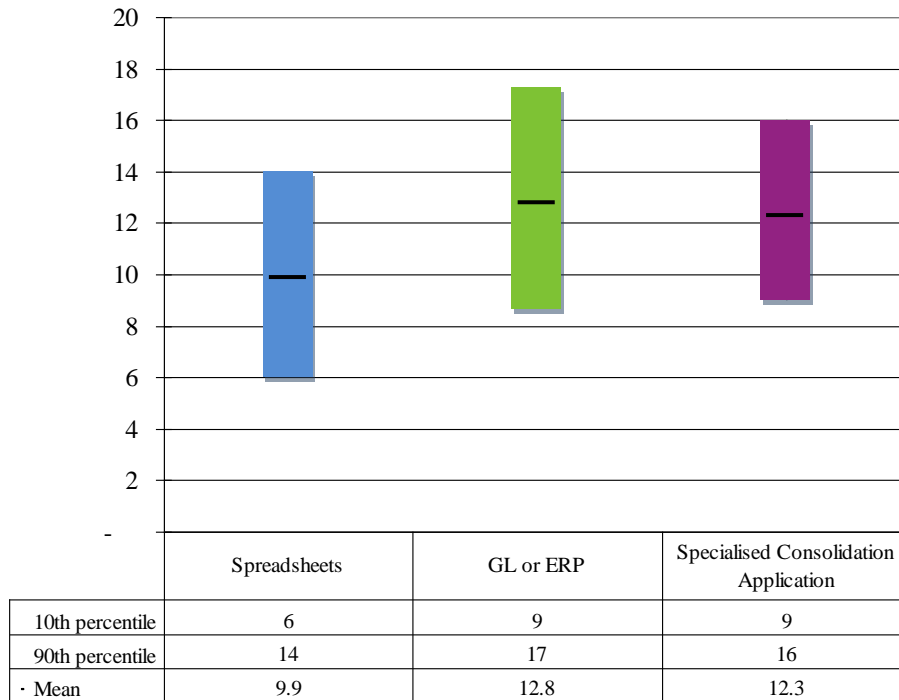
The large variation in the integration scores obtained indicates that many participants fail to utilise the functionalities of the GL/ERP modules or the specialised consolidation systems that could enhance integration. This was surprising since it emerged clearly from the interviews that participants realise that greater integration of the consolidation system could result in substantial benefits to the consolidation process. Equally, it was observed that many organisations that use spreadsheet consolidation applications obtained a high integration score due to automated data transfer processes that were enabled by macros (a type of spreadsheet programming).

5.2.1.5 Formalisation

The formalisation score attempted to gauge the level of internal controls that operate within the consolidation system and in its environment. Included in the formalisation score are issues such as the control that exists over access to the consolidation system

and how changes to the consolidation system are managed. The questionnaire items that comprise the formalisation score was determined by means of confirmatory factor analysis (refer to section 5.3). The score was calculated by summing the responses obtained from the relevant 5-point Likert items. The maximum formalisation score that could be achieved was 25.

The coloured bars in Figure 5.6 represent the 10th to the 90th percentile of the formalisation scores obtained by listed organisations that made use of the different types of consolidation systems, while the lines on the bars indicate the mean score. It is clear that spreadsheets are generally used in a more informal manner, where, for example, changes to the system are made without proper controls. GL/ERP modules appear to be used in a more formalised manner when compared to spreadsheets. Specialised consolidation applications obtained a marginally higher formalisation score when compared to GL/ERP modules, except that the 10th percentile is noticeably greater (13 for specialised applications, versus 10 for GL/ERP modules).

It emerged clearly from the semi-structured interviews that while the need for some level of internal controls is appreciated, the general sentiment regarding system formalisation is that it is often considered an "over kill" and causes the consolidation process to be unnecessarily delayed. It was also noted during the interviews that auditors and regulation promote higher levels of system formalisation. Auditors appear to oppose the use of spreadsheets as a consolidation application precisely because of the perception that it is used in an informal manner, which is supported by the findings of this research.

Figure 5.6: Formalisation by Consolidation Application

	Spreadsheets	GL or ERP	Specialised Consolidation Application
10th percentile	6	10	13
90th percentile	16	22	23
· Mean	11.5	16.4	17.9
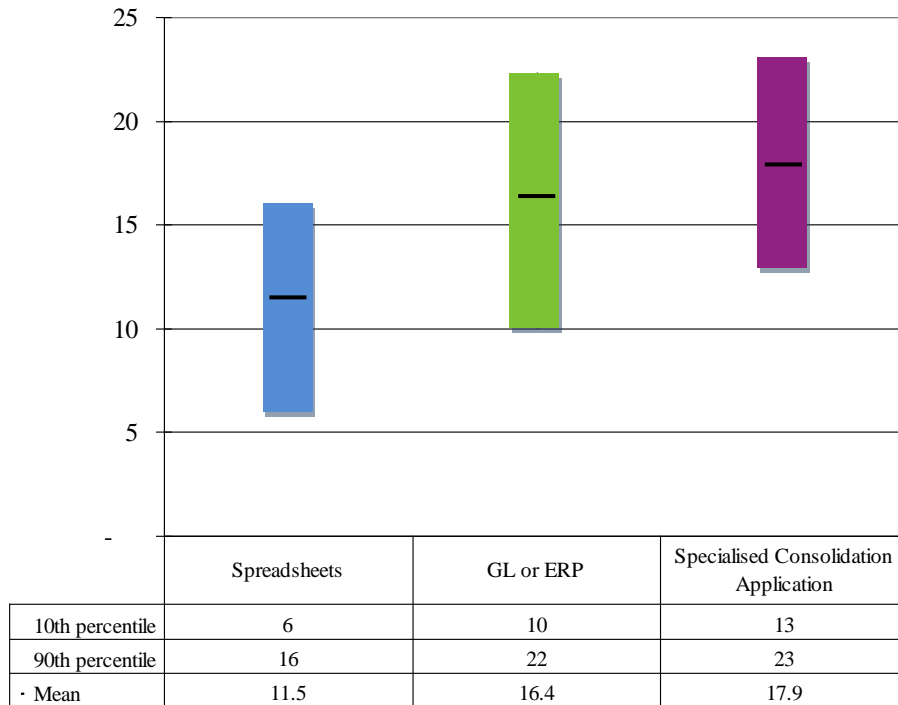
5.2.2   Consolidation System Performance

It was explained in Chapter 3 that the performance of a consolidation system should be measured in terms of its ability to provide relevant and reliable information. The reliability of information has not been included in the research model since it is not possible to measure it with an acceptable degree of accuracy. An important element of relevance relates to the timeliness of information, in other words, how soon after year-end it is made available to users. Chapter 3 details the arguments in favour of measuring the performance of the consolidation system by means of the number of days that are required to complete the consolidation process. However, it was also pointed out that such an argument does not imply that a highly performing consolidation system is the *only* factor that contributes towards an organisation's ability to perform a rapid consolidation.

For the purposes of this research, the year-end period was divided into three phases (refer to Figure 5.7). Phase 1 relates to the number of **working** days that entities within the organisation required to complete their own year-end processes, at the end of which the data is submitted to group for review and consolidation. Phase 2 relates to the number of **working** days that are used by the accountants to perform the organisation's consolidation. Phase 3 relates to the period after the consolidation has been completed until the financial results have been published. The financial statements are drafted and approved during this final period.

Figure 5.7: Financial Year-end Phases
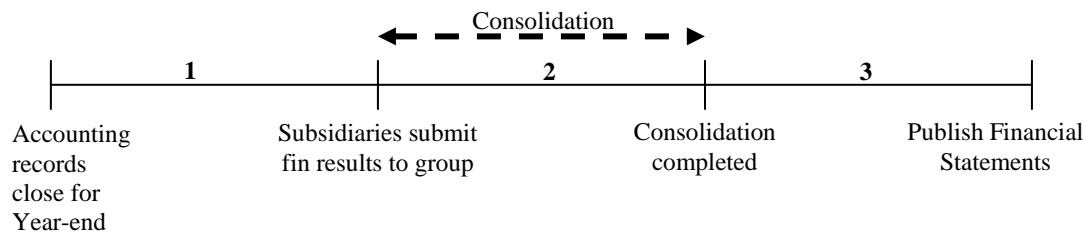
Apart from asking research participants to specify how many **working** days each of these periods took to complete during the most recent year-end, the questionnaire also required participants to indicate how many hours were worked during the consolidation phase of the year-end process (phase 2). This information was then used to normalise/adjust the consolidation period to ensure comparability. Without such adjustments, consolidation periods would not have been comparable if, for example, the group accountants at one organisation worked 16 hours per day during the consolidation period, while the group accountants at another organisation worked a normal eight hour day.

It can be observed in Figure 5.8 that organisations that use spreadsheet consolidations allowed their subsidiaries, on average, the longest period of time (18.7 working days) to submit their packs to group (phase 1), while the organisations that use specialised consolidation applications allow subsidiaries, on average, the least amount of time to submit their packs (14.6 working days).

Organisations that use spreadsheets were able, on average, to complete the consolidation in 7.9 adjusted working days, which is approximately half the period of time required by organisations that use specialised consolidation applications (14 adjusted working days). However, it should be kept in mind that the organisations that use specialised consolidation applications are generally more decentralised when compared to organisations that use spreadsheet consolidations (refer to Figure 5.3). The consolidations for a decentralised organisation would naturally be more complex, which would necessarily take longer to complete when compared to the period of time to complete the consolidation for a centralised organisation.

Figure 5.8: Year-End Phases by Consolidation Application Type (Working Days)
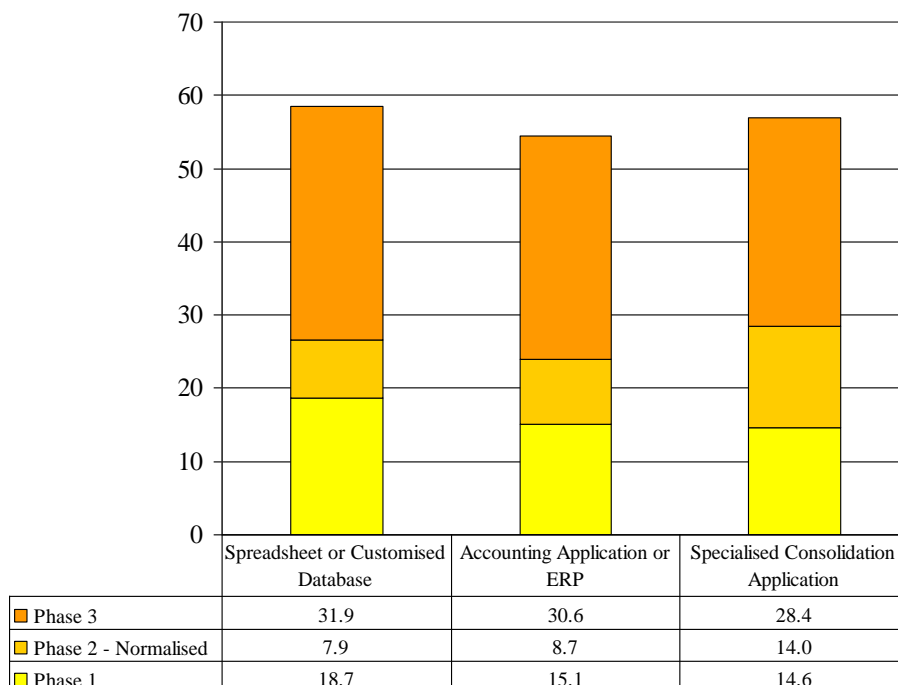
	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
Phase 3	31.9	30.6	28.4
Phase 2 - Normalised	7.9	8.7	14.0
Phase 1	18.7	15.1	14.6

The average number of days that were required to publish the financial statements after the consolidation has been completed (phase 3) was 31.9, 30.6 and 28.4 working days for spreadsheets, GL/ERP modules and specialised consolidation applications respectively.

Organisations that use GL/ERP modules were, on average, able to complete the entire year-end process in the least number of working days (54.4 days) while organisations that use spreadsheets as a consolidation tool required the longest period of time (58.5 days), despite requiring the shortest period of time to complete the actual consolidation (phase 2).

The data relating to the three phases of the year-end process was supplied in the self-completion questionnaire. However, independently from the questionnaire data, the researcher accessed the "Securities and Exchange News Service" (SENS) of the Johannesburg Securities Exchange (JSE). SENS is a public information system that is made available on the internet, on which all JSE listed organisations have to formally publish their financial results and make any other announcements required by the regulators. The SENS system was used to determine the actual date on which each research participant published the financial results relating to the most recent year-end. The publication date data was then used to calculate the number of working days after year-end that each participant required to formally publish their financial results on SENS.

The bars on Figure 5.9 represent the the 10th to the 90th percentile range of the number of working days that are required to publish year-end financial data on SENS, grouped according to the type of consolidation sytem that was used, while the lines on the bars indicate the mean. A comparison of Figure 5.9 with Figure 5.8 reveals a similar pattern: organisations that use GL/ERP modules as a consolidation tool require the shortest period of time to publish financial results (90th percentile of 57.4 working days), while the other two types of consolidation applications take somewhat longer.

The information displayed in Figure 5.9 corroborates the information displayed in Figure 5.8, which cross validates the data collected by means of the questionnaire.

Figure 5.9: SENS Publication Days by Consolidation Application Type (Working Days)

	Spreadsheets	GL or ERP	Specialised Consolidation Application
10th percentile	32.1	31.0	31.4
90th percentile	62.1	57.4	62.1
· Mean	47.5	43.5	46.5
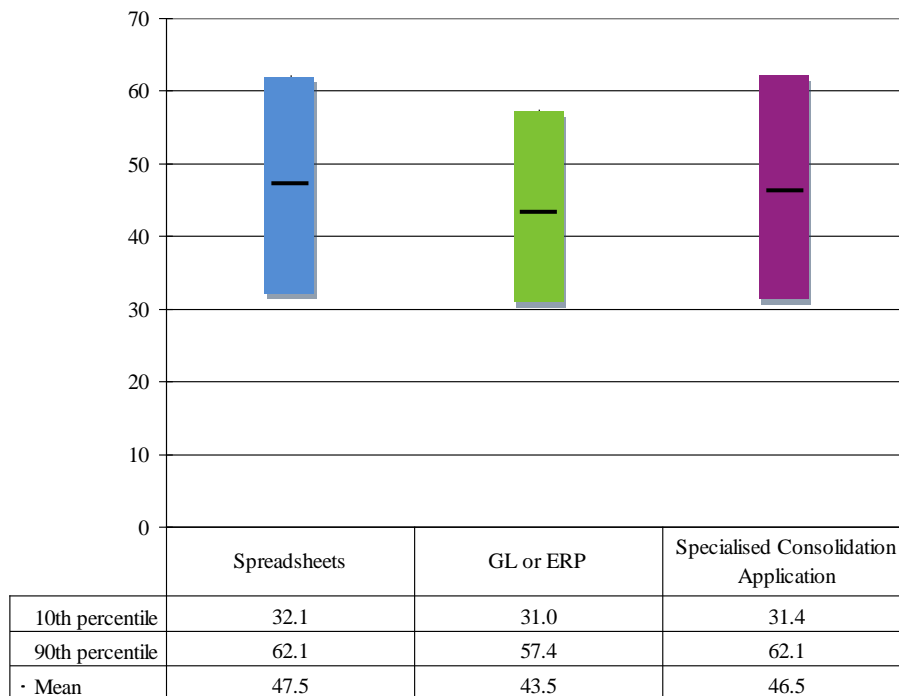
The decentralisation and SENS publication date data was analysed in order to allocate a percentile ranking to each research participant. In other words, each participant was allocated a percentile ranking in respect of the extent of its decentralisation and the number of days that were required to publicise its data on SENS. Every participant was then placed on a two dimensional grid (Figure 5.10) according to the percentile ranking in respect of decentralisation and working days to a SENS publication. Participants were divided into three groups in respect of decentralisation (horizontal axis) and

117

working days to SENS publication (vertical axis), which resulted in a grid that contained nine sections. The three decentralisation groups were named: centralised; semi-centralised; and decentralised. The three "working days to SENS publication" groups were named: fast; medium; and slow. The performance grid (Figure 5.10) that contains the nine sub-groups forms the basis of the analysis for the remainder of this section. This analysis will consider the average score regarding a particular variable that was obtained by the centralised, semi-centralised and decentralised groups across the slow, medium and fast categories. It is important to emphasise at this point that while some trends will be identified in the following section, causality cannot be established.

Figure 5.10: Performance Grid

Percentile – Decentralisation

Percentile – Working Days to SENS Publication

Slow

Medium

Fast

Centralised   Semi-Centralised   Decentralised
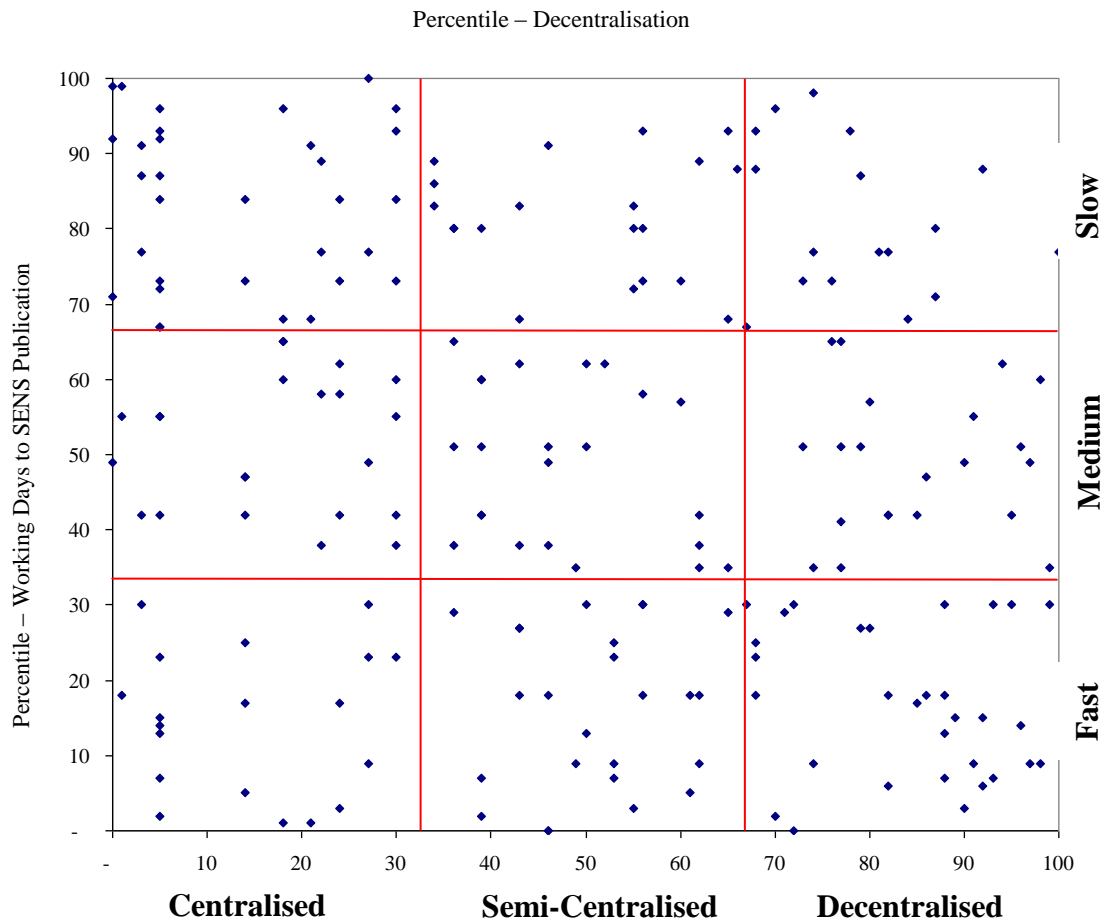
Figure 5.11 indicates the average number of days that each sub-group required to complete phase 1 (Figure 5.7) of the year-end process. Phase 1 represents the number of working days that the group accountants have to wait before the consolidation could be started. It is noted that all three lines generally slope downwards (negative slope), in other words, the Fast sub-groups of all three decentralisation groups required fewer days to complete phase 1, when compared to the Slow sub-groups. This trend was expected. However, it is interesting to observe that both the Medium and Fast sub-groups of the Decentralised group required 14 days to complete phase 1. The decentralised-slow sub-group need only 18 working days to complete phase 1, while the semi-centralised and centralised slow sub-groups need 23 working days each. This trend appears to corroborate the trend identified in Figure 5.8, where it was noticed that organisations that make use of specialised consolidation applications (who are more decentralised – Figure 5.3) require the least number of days to complete phase 1 of the year-end process.

Figure 5.11: Number of Working Days to Submit Packs to Group - Phase 1
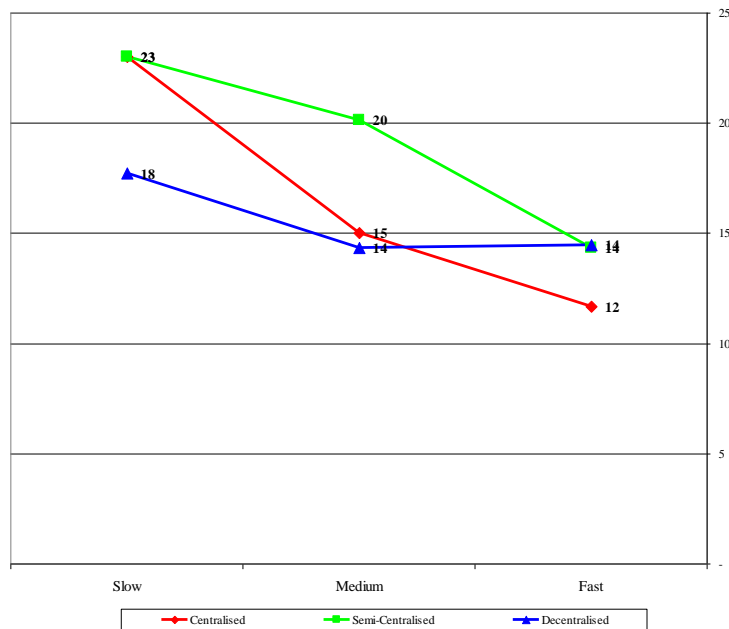
Figure 5.12 displays the average number of adjusted working days that are needed by each sub-group to complete the consolidation phase of the year-end process (Phase 2). It should be noted that, in line with expectation, semi-centralised and decentralised groups take longer to complete the consolidation than the centralised groups, which could be attributed to the lower level of complexity of the centralised group consolidation. Also in line with expectations is that all three Fast sub-groups need the least number of adjusted working days to complete the consolidation.

Figure 5.12: Number of Adjusted Working Days to Complete only the Consolidation - Phase 2
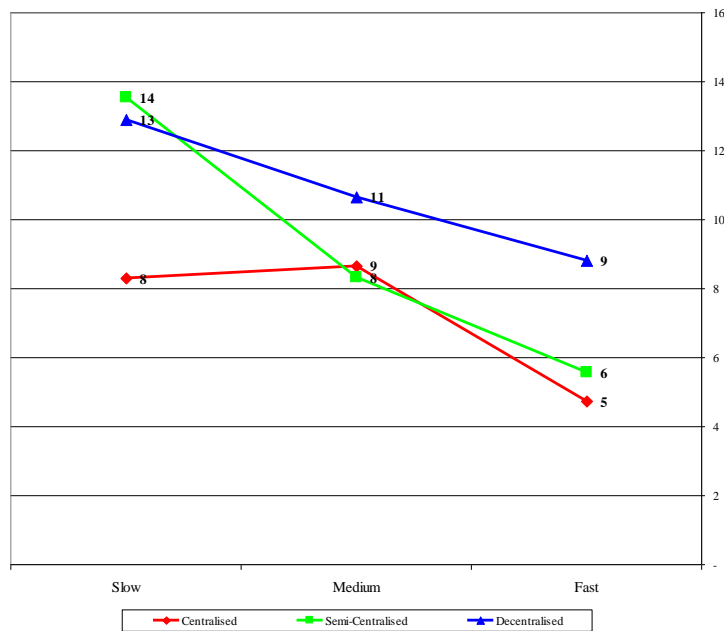
Figure 5.13 displays the average number of group accountants that are employed at group level for each of the sub-groups identified in the performance grid. These accountants exclusively employed at corporate group level and specifically exclude accountants that are employed at the subsidiary level. It can be observed that decentralised organisations employ more group accountants, across all three "Working

Days to SENS Publication" groups, when compared to centralised groups. It is particularly interesting to note that all three Fast sub-groups employ more accountants than the Medium sub-groups, with a significant increase in the decentralised group of almost one accountant (3.7 accountants for the Fast sub-group, compared to 2.8 accountants for the Medium sub-group). This trend indicates that more accountants are associated with a rapid publication of financial results.

Figure 5.13: Number of Accountants Employed at Group Level
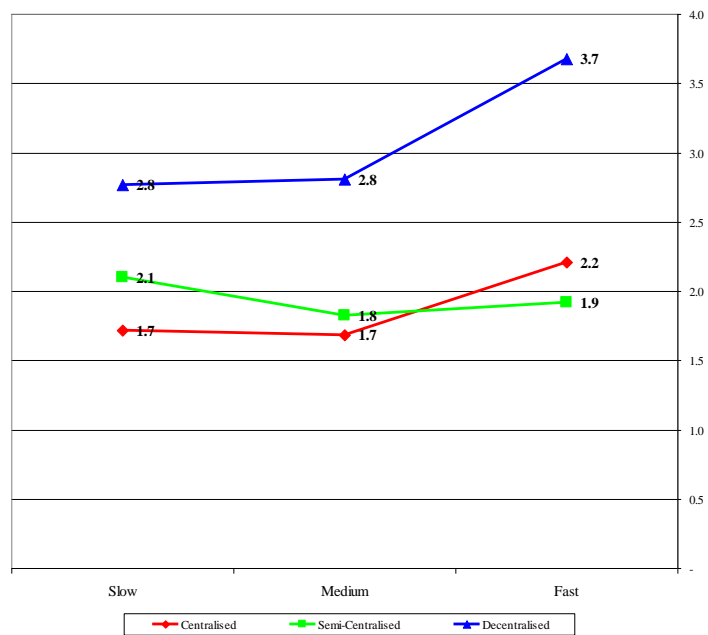
Figure 5.14 provides an indication of the amount of human resources that are required in order to complete the consolidation (Phase 2), which was calculated by multiplying the number of adjusted phase 2 days with the number of group accountants. It can be seen that decentralised organisations generally need to allocate more human resources to the consolidation process than centralised or semi-centralised organisations. This situation could be attributed to the greater level of complexity of a consolidation for a decentralised organisation, when compared to that of the centralised or semi-centralised organisations.

121

It was expected that the slope of all three graphs should have been equal to one or greater than one (upward sloping). In other words, all else being equal, it would require the same or more group accountant days to complete the consolidation rapidly than a somewhat slower consolidation. However, it was found that all three Fast groups required a smaller amount of human resources to complete the consolidation than the Slow groups (negative sloping graph), despite allocating more accountants to the consolidation task. This trend, which was contrary to expectations, would indicate that the consolidation system was designed and used in such a manner that enabled the Fast groups to complete the consolidation by means of a smaller amount of accountant days than the Slow groups. This trend provides some evidence that variations in the characteristics of the consolidation systems (formalisation, sophistication and integration) should be considered in order to explain variations in the ability of these systems to influence the amount of human resources that are expended to complete the consolidation.

Figure 5.14: Human Resources Expended to Complete the Consolidation
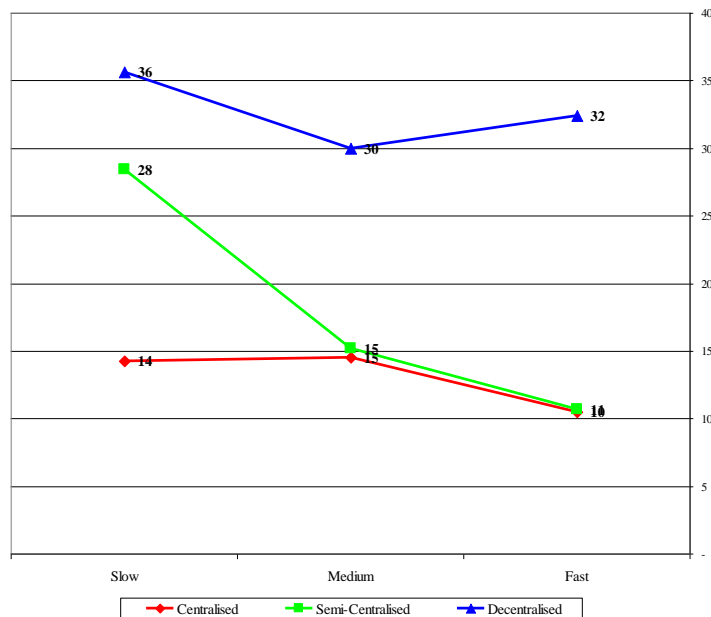
Figure 5.15 presents the human resources that are required to complete the consolidation for each entity in the listed organisations. The per entity figure was calculated by dividing the human resources expended to complete the consolidation with the number of entities in each organisation. It is clear that each of the three graphs in Figure 5.15 have a slope that is similar to the graphs for the equivalent groups in Figure 5.14. However, the relative vertical positions of the graphs on Figure 5.15 have changed. It is clear that decentralised organisations require a considerably lower amount of resources to complete the consolidation per entity in the organisation, while centralised organisations require the highest amount of per entity resources. This is clear evidence of the existence of economies of scale in the consolidation process – where a reduction in the average cost is associated with an increase in the output, which in this case is the number of entities in the organisation. This finding seems to support that of Guilding (1999) and Johnson and Kaplan (1987) who concluded that increased company size results in lower relative unit cost of information.

Figure 5.15: Per Entity Resources Expended to Complete the Consolidation

123
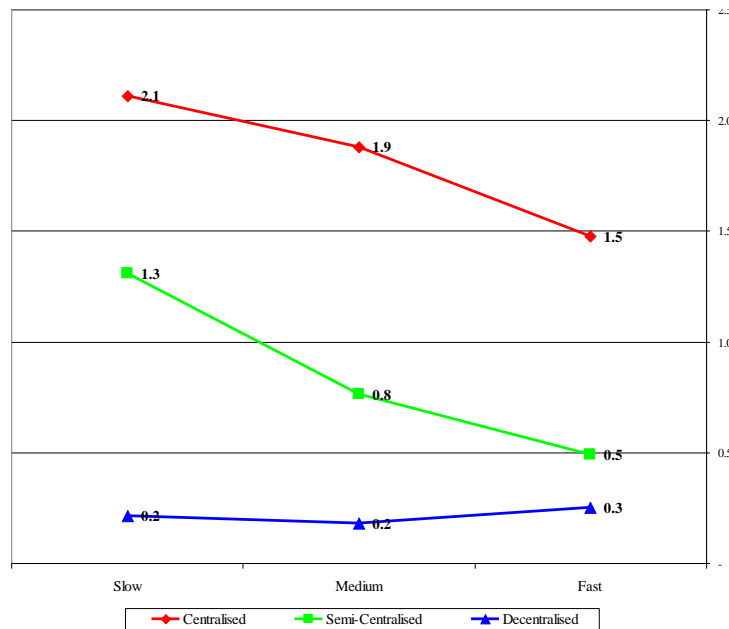
It has been noted earlier that spreadsheets are used, almost universally, by accountants as an integral part of the consolidation process. Evidence indicates that even organisations that use GL/ERP modules and specialised consolidation applications rely on spreadsheets to a certain extent. An item was included in the questionnaire to determine the extent to which spreadsheets are used during the consolidation process, irrespective of the type of consolidation application that was used. Figure 5.16 presents the data regarding this item. The score obtained by the centralised-slow sub-group has been set to 100, while the scores obtained by the other sub-groups have been set relative to that level. The absolute score obtained is not meaningful since only relative information is displayed in this graph. The first point that should be made is that decentralised organisations appear to rely on spreadsheets to a significantly lesser extent when compared to centralised and semi-centralised organisations. This observation is corroborated by the data displayed in Figure 5.3, which indicated that centralised organisations generally use spreadsheets as the primary consolidation tool, which would naturally lead to a greater level of reliance on spreadsheets during the consolidation process. The second point that should be noted is the negative slope of the graphs for the decentralised and the semi-centralised organisations. In other words, the Fast decentralised and semi-centralised organisations appear to rely on spreadsheets to a lesser extent than the Slow decentralised and semi-centralised. However, such a relationship does not seem to exist for centralised organisations. The trend that has been identified for decentralised and semi-centralised organisations concurs with the findings of a commercial survey of 208 large American companies (Ventana Research 2005), which concluded that companies that described themselves as heavy spreadsheet users took longer to complete the year-end close process when compared to companies that use spreadsheets in a more limited manner.

Figure 5.16: Use of Spreadsheets during Consolidation
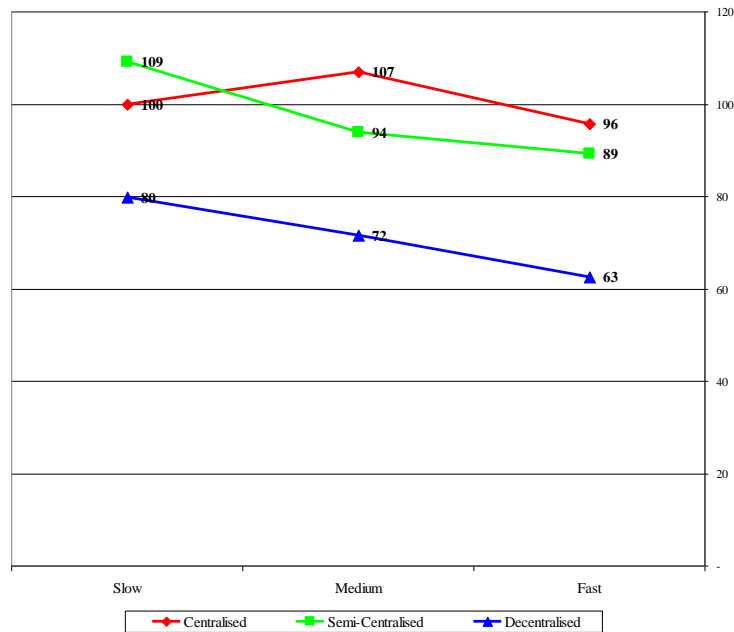
Figure 5.17 presents the data regarding the sophistication of participants' consolidation systems. The sophistication score obtained by the centralised-slow sub-group has been set to 100, while the scores obtained by the other sub-groups have been set relative to that level. The questionnaire items that comprise the sophistication score is discussed in the inferential statistical analysis section of this chapter. While the sophistication scores of the centralised and the semi-centralised groups do not differ significantly, it can be observed from Figure 5.17 that the sophistication score obtained by the decentralised groups was considerably higher. It should also be noted that the graphs for the semi-centralised and the decentralised groups follow a general upward slope from the Slow to the Fast groups, while the slope of the graph for the centralised groups is distinctly downward (100 for the Slow group and 94 for the Fast group). It can therefore be observed that for semi-centralised and the decentralised groups, an association appears to exist between the speed with which organisations publish financial results on SENS and slightly higher levels of consolidation system sophistication. However, for centralised organisations, this trend appears to be inverted

where lower levels of consolidation system sophistication are associated with a faster publication on SENS.

Figure 5.17: Sophistication
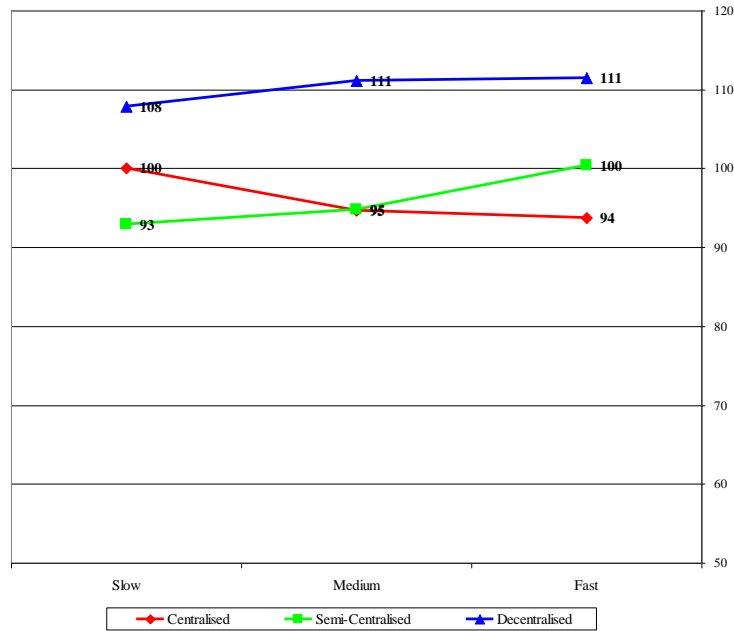
Figure 5.18 presents the data regarding the integration of participants' consolidation systems. The same trends discussed in the preceding paragraph dealing with sophistication (Figure 5.17) have also been identified in Figure 5.18. It can be observed that the integration scores obtained by decentralised organisations are higher than the integration scores obtained by centralised and semi-centralised organisations. The slope of the graphs for the decentralised and the semi-centralised groups also follow a general upward slope. The slope of the graph for the centralised group follows a downward slope. While this latter trend is similar to that of the sophistication scores, it does appear that the upward slopes of both the decentralised and the semi-centralised groups are steeper, in other words, there is a greater difference between the integration scores of the Slow and the Fast groups. This data seems to support the existence of an association between higher levels of consolidation system integration and the speed with which semi-centralised and decentralised organisations publish financial results on SENS. This apparent trend was confirmed by interviewees (Companies 2, 3, 5 and 7),

who stated that greater consolidation system integration was expected to reduce the period of time that is required to complete the consolidation. However, this trend appears to be inverted for centralised organisations where somewhat lower levels of consolidation system integration are associated with a faster SENS publication.

Figure 5.18: Integration
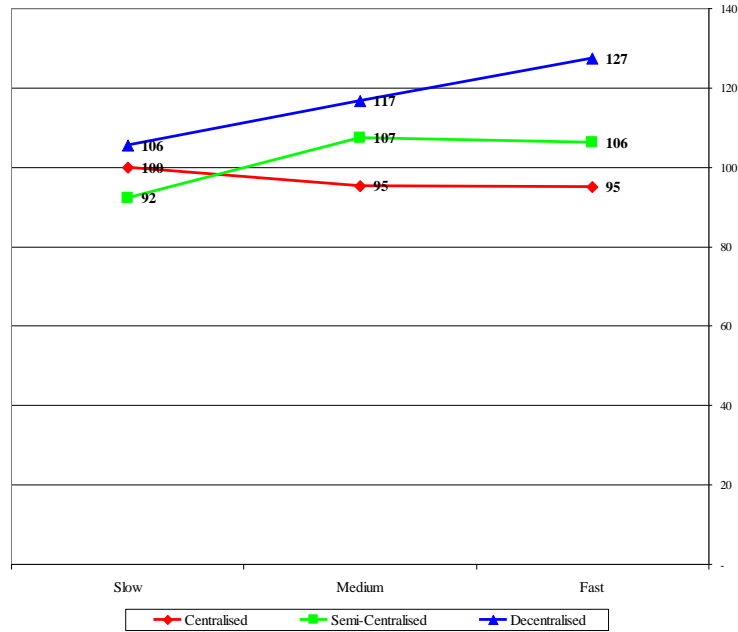
Figure 5.19 presents the data regarding the formalisation of participants' consolidation systems. It can be observed that the formalisation scores obtained by decentralised organisations are considerably higher than that of the centralised and the semi-centralised groups. The formalisation score obtained by the Fast centralised, semi-centralised and the decentralised groups are all greater than the formalisation scores obtained by the equivalent Slow groups. It should be pointed out that the slope of the formalisation graph (Figure 5.19) for decentralised organisations is noticeably steeper than the slopes of the sophistication (Figure 5.17) and integration graphs (Figure 5.18). It would therefore appear that, particularly for semi-centralised and decentralised organisations, a faster SENS publication is associated with greater levels of consolidation system formalisation. This apparent association contradicts the views expressed by some interviewees: It was mentioned in Chapter 6 that the formalisation

of the consolidation process was considered to be an unnecessary bureaucratisation that will result in needless delays.

Figure 5.19: Formalisation
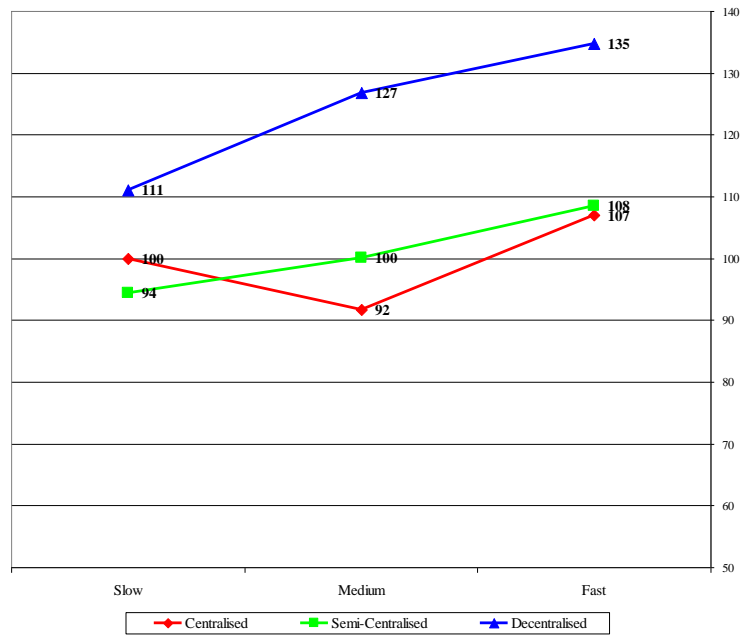
It was also noted in Chapter 6 that a tradeoff was perceived to exist between the system formalisation and sophistication, where a greater system formalised will necessitate a somewhat lower level of sophistication. The perceived trade-off between formalisation and sophistication could account, particularly in decentralised organisations, for the lack of a significant increase in the sophistication scores from the Slow to the Fast groups (Figure 5.17), while the formalisation scores do increase significantly from the Slow to the Fast groups (Figure 5.19).

5.3 Inferential Statistical Analysis

Inferential statistics involves the use of statistics to make inferences in relation to some aspect of a population from a random sample drawn from it. The purpose of inferential statistical analysis in this research is to test the hypotheses that were advanced in Chapter 3; and to test the extent to which the contingency model (Figure 3.1) is supported by the research data. A confirmatory factor analysis was used to assess construct validity of the latent variables (sophistication, formalisation and integration) in the research model. The results of the confirmatory factor analysis was used as one of the inputs to the structural equation model (SEM), which was developed to consider the interrelationships between the extent of organisational decentralisation; the consolidation system characteristics; and the resources that are required to complete consolidation.

5.3.1   Confirmatory Factor Analysis

Confirmatory factor analysis is a special form of factor analysis that is used to evaluate the number of factors and the loadings of variables. The researcher uses knowledge of the theory in order to postulate the relationship pattern a priori. The process of performing a confirmatory factor analysis was started by the development of a measurement model. This measurement model consisted of a collection of confirmatory factor analysis models. The model that is presented in Figure 5.20 was developed by means of five stages: Stage one involved the modelling of the sophistication construct as a one-dimensional latent variable. This model resulted in a very poor fit, which was consequently rejected, even after proxies (questionnaire items) with very low squared multiple correlations were removed. Thereafter, sophistication was modelled as a two-dimensional construct, with a covariance between the constructs. This revised model resulted in a considerably improved fit. The second stage involved the modelling of formalisation as a single dimension, which again resulted in a poor fit. The formalisation construct was then also modelled with two

latent variables, resulting in a much improved fit. Stage three involved the development of a model for the integration construct, which followed a procedure similar to that of sophistication and formalisation and also resulted in a two-dimensional construct. The fourth stage involved the inclusion of all the first-order latent variables, developed during stages one to three, in a single model, which included six first-order latent variables (two each for sophistication, formalisation and integration) with covariances between the six latent constructs. In stage five, a model was developed that included higher-order factors. This second-order model included fewer parameters, resulting in a more parsimonious model; and was conceptually more attractive than the model that was developed upon the completion of stage four. This second-order model is the measurement model that was adopted for this research and is presented in Figure 5.20. The measurement model is discussed in greater detail in the following section. The estimated parameters and the measures of fit have been included in Tables H1 to H6 (Appendix H) and Table 5.4.

5.3.1.1 Sophistication

Nine questionnaire items were initially proposed to measure the sophistication latent variable (refer to section 3.5.3). However, upon further investigation, it emerged that sophistication could be conceptualised as a higher-order dimension, which comprises of two first-order latent variables, namely "Intercompany transactions" and "Automated control" (Figure 5.20). The "Intercompany transactions" latent variable relates to the consolidation functions that are automated by the consolidation system, which are necessary due to any form of transaction between entities within an organisation. These transactions include, amongst others, the provision of goods or services, the lending of money, or the purchasing of share capital. The "Intercompany transactions" latent variable is indicated by three questionnaire items: S1, S2 and S5 (Table 5.1.). The "Automated controls" latent variable relates to the internal controls that the consolidation system either facilitates or automates. The "Automated controls" latent variable is indicated by three questionnaire items: S3, S4 and S8 (Table 5.1.). The unallocated items were excluded due to their low squared multiple correlations.

Table 5.1:   Items relating to Sophistication

First Order Latent Variable	Questionnaire Item
Inter-company transactions	S1: Automated intercompany transaction eliminations
Inter-company transactions	S2: Automated intercompany balances eliminations
Automated control	S3: Includes budgeting and forecasting data
Automated control	S4: Includes non-financial data
Inter-company transactions	S5: Automated accounting entries to consolidate investments
	S6: Automated consolidated cash flow
	S7: Automated foreign exchange calculations
Automated control	S8: Automated validation calculations
	S9: Automated tax calculations

5.3.1.2 Formalisation

Formalisation was initially measured using ten questionnaire items (refer to section 3.5.2). However, it was found that formalisation could best be modelled as a higher order dimension with two underlying first order latent constructs: "Access control" and "Application control" (Figure 5.20). "Access control" refers to the restrictions placed on the users to prevent unauthorised access and unauthorised changes to the consolidation system. Questionnaire items F1, F5 and F9 were found to be the best indicator for "Access control" (Table 5.2.). "Application control" refers to the restrictions that have been imposed on the ability of users of the consolidation system to perform certain functions and view certain data, once the consolidation system has

been accessed. Items F2 and F3 were the best indicators for "Application control" (Table 5.2.). The remaining items were excluded due to their low squared multiple correlations.

Table 5.2:   Items relating to Formalisation

First Order Latent Variable	Questionnaire Item
Access control	F1: Access control - username password
Application control	F2: Function control
Application control	F3: Restricted views
	F4: User changes controlled
Access control	F5: New user access controlled
	F6: Formalised training
	F7: Access control – network
	F8: Administrator changes controlled
Access control	F9: Formalised change control
	F10: New user training

5.3.1.3 Integration

Integration was initially measured by means of five questionnaire items (refer to section 3.5.1). It was found that, in a manner similar to sophistication and formalisation, integration could best be modelled as a higher order dimension with two underlying first order latent constructs: "Integrated Input" and "Integrated Output" (Figure 5.20). "Integrated Input" refers to the automated data transfer that takes place during the transfer of data *into* the consolidation system (questionnaire items I1 and I3 – Table 5.3), while "Integrated Output" relates to the automated transfer of data from the

consolidation system into both internal and external financial reports (questionnaire items I2 and I4 – Table 5.3). Questionnaire item I5 was excluded because it did not contribute to any of the lower order dimensions and because of its low squared multiple correlation – indicating that the item shared very little common variance with the items I1 to I4 in the model.

Table 5.3:   Items relating to Integration

First Order Latent Variable	Questionnaire Item
Integrated input	I1: Manual spreadsheet data capture (reverse coded)
Integrated output	I2: Manual financial reports data capture (reverse coded)
Integrated input	I3: Accountants transfer GL data (reverse coded)
Integrated output	I4: Internal reports automated data transfer
	I5: External reports automated data transfer

When confirmatory factor analysis modelling is performed within a SEM framework, it is advised that one indicator per latent variable should have its regression weight constrained to unity in order to set the scale of the latent variable and for the purposes of model identification (Bollen 1989; Steenkamp and Baumgartner 1998).   The remaining parameters should be left free to be estimated. The final measurement model is presented in Figure 5.20 and the parameter estimates are provided in Tables H1 to H3 (Appendix H), with the estimated squared multiple correlations shown in Table H4 (Appendix H).   In order to avoid a problem with negative error variances, the error variances e5 and e6 were constrained to be equal to 0.05. All the regression weights were positive and highly significant (Table H1 – Appendix H).   The estimated covariances are presented in Table H2 (Appendix H), and are all highly significant.

Figure 5.20: Measurement Model: Conceptual Diagram of second-order confirmatory factor analysis model of Consolidation System Sophistication, Formalisation and Integration
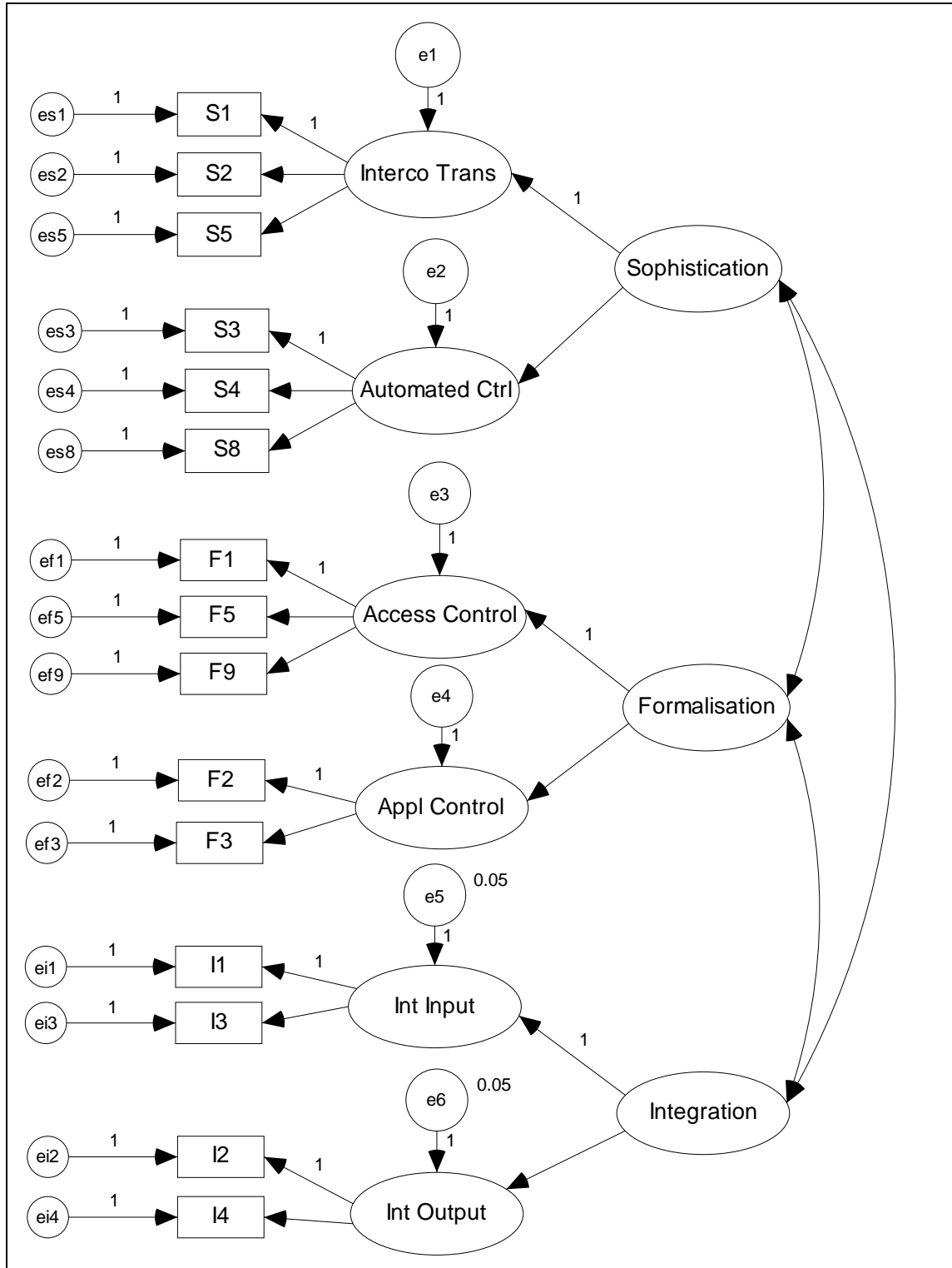
5.3.1.4 Fitting the Model

Fitting the model means changes to the proposed model are considered in order to provide the best possible reflection of the data. Certain measures, referred to as Modification Indices (MI), are calculated to highlight additional relationships that, if added to the model, would result in an improved fit of the model with the underlying data. However, when the sample size is large, even minor discrepancies may trigger MI flags. As a result, relationships between variables in the model should be added only if the new relationship makes theoretical sense. This would prevent 'over-fitting' the model to data noise and sampling fluctuations.

Modification indices were calculated and are presented in Tables H5 and H6 (Appendix H). It is generally accepted that MI greater than five should be accepted as an indication of the need to include additional parameters, provided that it makes sense substantively (Bollen 1989). Since none of the modification indices larger than 5 made sense from a theoretical perspective, the measurement model was left as shown in Figure 5.20.

5.3.1.5 Assessment of Fit

The use of a confirmatory factor analysis in a SEM framework requires the consideration of several measures to determine how well the model fits the data. It is necessary to report a range of different fit measures because each measure captures different elements of the model fit. In addition to the fit measures, it is important that the researcher should use his/her substantive knowledge of the theory during all stages of the model specification process. Once the model has been specified, the magnitude and signs of the parameters should be in accordance with the theory. Furthermore, the standard errors of the parameters and the significance of the estimates should be evaluated (Raykov and Marcoulides 2000). Rules of thumb, or guidelines, have been

developed for each measure of fit that have to be adjusted on the basis of certain contextual factors, such as sample size.

The first descriptive fit index that was proposed in the SEM literature was the goodness-of-fit index (GFI), which can be interpreted as the proportion of the variance and covariance that is explained by the model. The GFI is equivalent to the R-square in regression analysis. The adjusted goodness-of-fit index (AGFI), considers the complexity of the model. The values of GFI and AGFI range between zero and one. When the models fit the data well, the values of the GFI and AGFI will be closer to one. Hu and Bentler (1999) suggest that models that obtain a GFI and AGFI scores of greater than 0.90 should be regarded as a good fit. The measurement model obtained a GFI score of 0.942 and an AGFI score of 0.961, which should be considered very acceptable levels of fit (Table 5.4).

Other descriptive indices that should be considered in this context are the incremental fit index (IFI) and the non-normed fit index (NNFI), also known as the Tucker and Lewis Index (TLI) (Bentler and Bonett 1980). These fit indices are calculated by using ratios of the measurement model's chi-square and the chi-square of the null model, in which absolutely no interrelationships are assumed to exist between any of the variables. The NNFI or TLI fit indices take model complexity into account. The measurement model obtained an IFI of 0.980 and a TLI of 0.974 (Table 5.4). Hu and Bentler (1999) suggest that a model should be regarded as a good fit when it obtains NNFI or TLI scores of greater than 0.90, and should be considered a very good fit if scores of 0.95 and above are obtained (Bollen 2007). It is clear that, according to the NNFI and TLI fit indices, the measurement model fits the data very well.

The Root Mean Square Error of Approximation (RMSEA), proposed by Browne and Cudeck (1993), is a very popular and widely accepted index of model fit. The RMSEA considers model complexity but has less rigid requirements for degree of fit. Two of the most significant advantages of the RMSEA is that it evaluates the extent to which the model fails to fit the data and that the sample size does not affect the score obtained.

It is generally acknowledged that a model that fits the data well should obtain a RMSEA of 0.05 or less (Raykov and Marcoulides 2000). Values between 0.05 and 0.08 indicate an acceptable level of fit; values between 0.08 and 0.10 a marginal fit; and values greater than 0.10 a poor fit. A useful aspect of the RMSEA index is that confidence intervals for the measure can be calculated. If the confidence interval is not too wide and both limits are less than 0.05, it can be argued that the model is a credible way of describing the data (Fabrigar, Wegener et al. 1999). Raykov and Marcoulides (2000) indicate that it is important that the lower limit of the RMSEA confidence interval should be considerably less than 0.05 to indicate a very good fit. The RMSEA obtained by the measurement model is 0.034, with an upper limit of 0.054 (Table 5.4), which indicates very acceptable levels of fit.

Table 5.4:   Fit measures for the Measurement Model

Fit Measure Model		Default model	Saturated model	Independence model
Chi-Square				
NPAR		37	120	15
CMIN		103.627	0	1090.277
DF		83	0	105
P		0.062		0
CMIN/DF		1.249		10.384
RMR and GFI				
RMR		0.079	0	0.443
GFI		0.942	1	0.489
AGFI		0.916		0.416
PGFI		0.652		0.428
Baseline Comparisons				
NFI	Delta1	0.905	1	0
RFI	rho1	0.880		0

IFI	Delta2	0.980	1	0
TLI	rho2	0.974		0
CFI		0.979	1	0
Root Mean Square Error of Approximation				
RMSEA		0.034		0.212
LO 90		0.000		0.201
HI 90		0.054		0.223
PCLOSE		0.897		
Information Criteria Measures				
AIC		177.627	240.000	1120.277
BCC		183.762	259.896	1122.764
BIC		301.470	641.653	1170.483
CAIC		338.470	761.653	1185.483

It can therefore be inferred with an acceptable degree of confidence that the measurement model fits the data well since all the commonly used fit indices fall within the recommended ranges. The output of the measurement model will firstly be used to test the hypotheses developed in Chapter 3 and secondly be applied in a SEM.

5.3.2   Pearson Correlations

Otley (1980) argued that a contingency theory of accounting should identify specific aspects of an accounting system that are associated with certain defined circumstances and demonstrate an appropriate matching.   In this research model, the defined circumstance is the extent of organisational decentralisation, while the specific aspects of the accounting system are integration, formalisation and sophistication. Hypotheses one to four that were proposed in Chapter 3 will be tested by means of the Pearson Correlations Coefficient.

The analysis that forms part of the Pearson Correlation Coefficient calculation required composite scores to be developed for each of the six first order latent variables and also for the three second order latent variables (Figure 5.20). It is important to note that the composite scores that have been developed approximates the latent variables in the measurement model but is not exactly equal to these variables. The composite scores were calculated as follows: A composite score named SOP1 was created which is the mean of items S1, S2 and S5. SOP1 is therefore equivalent to the "Inter-company Transactions" first order latent variable in the measurement model (Figure 5.20). Following the same argument, SOP2 is the mean of items S3, S4 and S8 (corresponding to the "Automated Control" latent variable); FOR1 is the mean of items F1, F5 and F9 (corresponding to the "Access Control" latent variable); FOR2 is the mean of items F2 and F3 (corresponding to the "Application Control" latent variable); INT1 is the mean of items I1 and I3 (corresponding to the "Integrated Input" latent variable); and INT2 is the mean of items I2 and I4 (corresponding to the "Integrated Output" latent variable). LXX is the natural logarithm of the decentralisation variable (independent variable), which has been described in section 3.3. LY2 is the natural logarithm of the group accounting resources required to complete the consolidation, which has been described in section 3.6. A natural logarithmic transformation was performed on LXX and LY2 in order to comply with the requirement of parametric statistics that variables approximate a normal distribution.

Table 5.5(a): Pearson Correlation Coefficient (N=210)

	Pearson Correlation		**Sig. (2-tailed)**	
	LXX	**LY2**	**LXX**	**LY2**
LXX	1.000			
LY2	**0.399	1.000	0.000	
SOP1	0.092	-0.009	0.182	0.901
SOP2	**0.262	**0.181	0.000	0.009
FOR1	**0.305	**0.183	0.000	0.008
FOR2	**0.290	*0.150	0.000	0.030

INT1	**0.254	-0.016	0.000	0.817
INT2	**0.208	0.003	0.002	0.965

Table 5.5(a) shows that there are highly significant (using α=0.01) positive correlations between Decentralisation (LXX) and SOP2, FOR1, FOR2, INT1 and INT2. Only the SOP1 composite score does not have a statistically significant correlation with LXX at α=0.05.

Approximations of the second order latent variables were also calculated by obtaining composite scores named SOP (corresponding to the "Sophistication" second order latent variable), as the mean of items S1, S2, S3, S4, S5 and S8, FOR as the means of items F1, F2, F3, F5 and F9 (corresponding to the "Formalisation" second order latent variable), as well as INT as the mean of items I1, I2, I3 and I4 (corresponding to the "Integration" second order latent variable). The correlations of these composite scores with the LXX variable are presented in Table 5.5(b).

Table 5.5(b):Pearson Correlation Coefficient (N=210)

	Pearson Correlation				
	LXX	**LY2**	**SOP**	**FOR**	**INT**
LXX	1.000				
LY2	*0.399	1.000			
SOP	*0.216	0.104	1.000		
FOR	*0.350	*0.198	*0.452	1.000	
INT	*0.270	-0.007	*0.295	*0.355	1.000
	Sig. (2-tailed)				
LXX					
LY2	0.000				
SOP	0.002	0.132			
FOR	0.000	0.004	0.000		
INT	0.000	0.914	0.000	0.000	

On the basis of the results of the Pearson Correlation Coefficient analysis, displayed in Table 5.5(b), the following conclusions can be made in relation to the proposed hypotheses:

- H1: Greater organisational decentralisation is positively related to consolidation system integration.

  The Pearson Correlation Coefficient between LXX (Decentralisation) and INT (Integration composite score) at $\alpha=0.01$ is 0.27.

  Hypothesis 1 is therefore not rejected.

- H2: Greater organisational decentralisation is positively related to consolidation system formalisation.

  The Pearson Correlation Coefficient between LXX and FOR (Formalisation composite score) at $\alpha=0.01$ is 0.35.

  Hypothesis 2 is therefore not rejected.

- H3: Greater organisational decentralisation is positively related to consolidation system sophistication.

  The Pearson Correlation Coefficient between LXX and SOP (Sophistication composite score) at $\alpha=0.01$ is 0.261.

  Hypothesis 3 is therefore not rejected.

- H4: Greater organisational decentralisation is positively related to the group accounting resources required to complete the consolidation.

  The Pearson Correlation Coefficient between LXX and LY2 (group accounting resources required to complete the consolidation) at $\alpha=0.01$ is 0.399.

Hypothesis 4 is therefore not rejected.

5.3.3 Structural Equation Modeling

SEM was used by this research in order to evaluate the concept of fit in contingency theory, which was explained in detail in section 3.7. One of the most useful aspects of SEM in the context of this research is that it enables the researcher to test a model with multiple dependants that include several mediating variables. The mathematical complexities of estimating and testing the relationships between numerous latent and observed variables render the use of computer software a necessity in the application of SEM. The AMOS (version 17) computer application was used during the development of the SEM of this research.

Subsequent to the completion of the measurement model (Figure 5.20), a SEM (Figure 5.21) was developed that included two endogenous variables: LXX, the natural logarithm of the decentralisation variable (independent variable); and LY2, the natural logarithm of the group accounting resources required to complete the consolidation. A natural logarithmic transformation was performed on LXX and LY2 in order to comply with the requirement of SEM that variables should approximate a normal distribution. Figure 5.21 presents the SEM that was fitted and tests the effects of Decentralisation as an observed variable, and the effects of Sophistication, Formalisation and Integration as second order latent variables on the resources that are required to complete the consolidation (LY2).

Figure 5.21: Structural Equation Model linking Sophistication, Formalisation and Integration to degree of Decentralisation and Group Accounting Resources
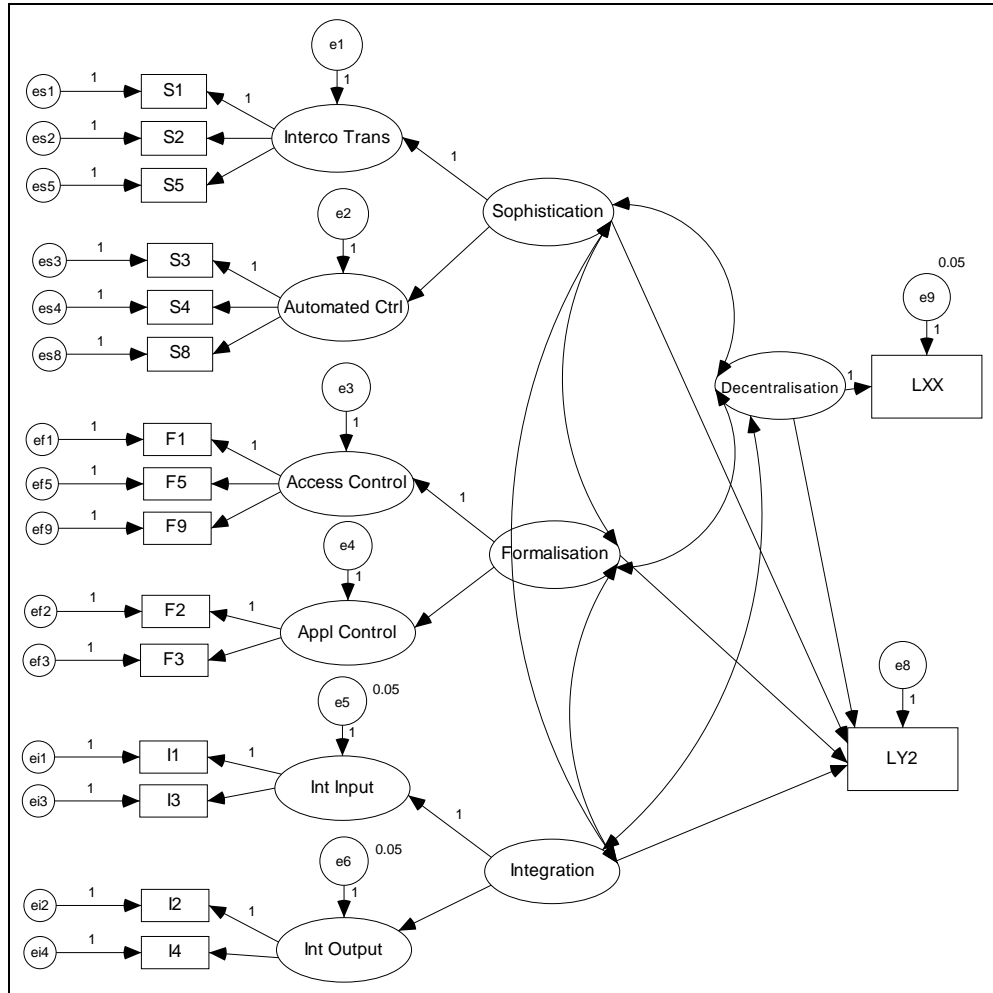
The SEM depicted in Figure 5.21 is presented in a complex manner due to the inclusion of the numerous observed measures and first order latent variables that form part of the original measurement model (Figure 5.20). Figure 5.22 is a simplified depiction of the SEM, but does capture the essence of the research model.

Figure 5.22: Research Model
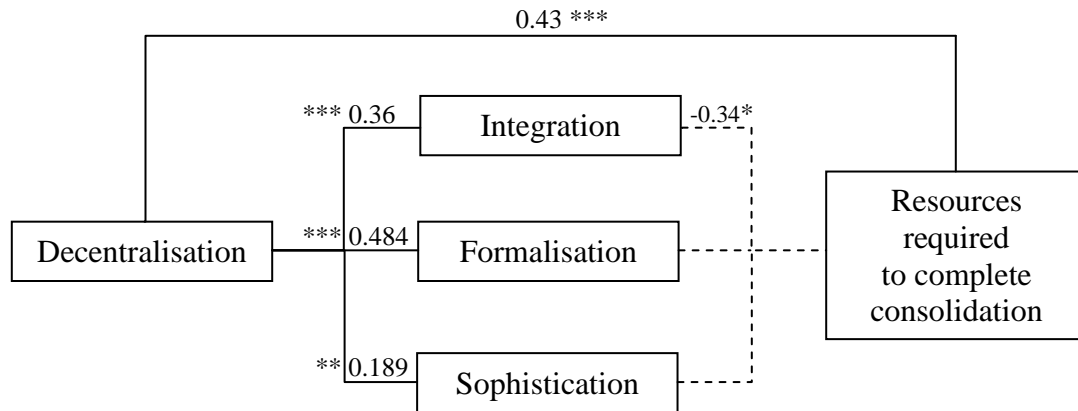
*** - parameter estimate significantly different from zero using a significance level α = 0.001

** - parameter estimate significantly different from zero using a significance level α = 0.01

* - parameter estimate significantly different from zero using a significance level α = 0.05

The part of the SEM that is particularly relevant to this contingency study concerns the relationships between integration, formalisation, sophistication and the resources that are required to complete the consolidation (depicted by the dotted arrows in Figure 5.22). The first point that should be made is that the paths between Sophistication, Formalisation and the resources that are required to complete the consolidation (LY2) are not significant at the 5% level of significance (Table 5.6). Only the path between Integration and the resources that are required to complete the consolidation (LY2) is significant at α=0.05, with a coefficient that has a negative sign: -0.34. This implies that a higher the level of consolidation system integration is related to a lower amount of resources that are required to complete the consolidation (LY2). The mediating influence of integration therefore causes the amount of accounting resources that are required to complete the consolidation to be reduced for a given level of organisational decentralisation. This result is exactly what was expected according to contingency theory in relation to consolidation system integration. However, it is disappointing that

a similar result was not produced in relation to consolidation system formalisation and sophistication.

The path coefficient between Decentralisation (LXX) and the accounting resources that are required to complete the consolidation (LY2) is highly significant and has a positive value of 0.43 (Table 5.6). This implies that a higher level of organisational decentralisation will require a greater amount of resources to complete the consolidation.

The path coefficient between Decentralisation (LXX) and the formalisation of the consolidation system has a positive value of 0.484 (Table 5.7). This coefficient is highly significant and has the highest value within the SEM. This finding is consistent with that of Chenhall (2003) who concluded that large decentralised organisations are associated with a strong emphasis on formal internal control systems.

Table 5.6: **Maximum likelihood regression weight estimates for Model 2**

			Estimate	**S.E.**	**C.R.**	**P**
Interco Trans	<---	Sophistication	1.000			
Automated Ctrl	<---	Sophistication	2.343	.542	4.324	***
Access Control	<---	Formalisation	1.000			
Appl Control	<---	Formalisation	.764	.140	5.467	***
Int Input	<---	Integration	1.000			
Int Output	<---	Integration	.930	.148	6.293	***
S5	<---	Interco Trans	.587	.067	8.748	***
S2	<---	Interco Trans	.985	.070	14.135	***
S1	<---	Interco Trans	1.000			
S8	<---	Automated Ctrl	.495	.082	6.061	***
S4	<---	Automated Ctrl	.594	.091	6.542	***

			Estimate	S.E.	C.R.	P
S3	<---	Automated Ctrl	1.000			
F9	<---	Access Control	.876	.093	9.428	***
F5	<---	Access Control	.912	.093	9.803	***
F1	<---	Access Control	1.000			
F3	<---	Appl Control	.742	.108	6.875	***
F2	<---	Appl Control	1.000			
I3	<---	Int Input	.371	.106	3.489	***
I1	<---	Int Input	1.000			
I4	<---	Int Output	.694	.123	5.634	***
I2	<---	Int Output	1.000			
LY2	**<---**	**Formalisation**	**.209**	**.218**	**.958**	**.338**
LY2	**<---**	**Integration**	**-.340**	**.152**	**-2.236**	******
LY2	**<---**	**Sophistication**	**.151**	**.367**	**.413**	**.680**
LXX	<---	Decentralisation	1.000			
LY2	<---	Decentralisation	.430	.079	5.420	***

*** - parameter estimate significantly different from zero using a significance level $\alpha = 0.001$

** - parameter estimate significantly different from zero using a significance level $\alpha = 0.05$

Similar to the covariances of the measurement model (Table H2 – Appendix H), the estimated covariances for the SEM are provided in Table 5.7. The estimated covariances between the three characteristics of the consolidation system are all highly significant, with the highest covariance between "Formalisation" and "Integration".

Table 5.7:   Estimated covariances for the Structural Equation Model

	Estimate	**S.E.**	**C.R.**	**P**
Sophistication <--> Formalisation	.364	.098	3.723	***
Sophistication <--> Integration	.251	.076	3.292	***
Formalisation <--> Integration	.508	.116	4.369	***
Sophistication <--> Decentralisation	.189	.066	2.884	**
Formalisation <--> Decentralisation	.484	.112	4.313	***
Integration <--> Decentralisation	.360	.107	3.367	***

*** - parameter estimate significantly different from zero using a significance level α = 0.001

** - parameter estimate significantly different from zero using a significance level α = 0.01

The fit measures displayed in Table 5.8 reveals that the SEM possesses a good fit. The GFI=0.938 and AGFI=0.911 (Table 5.8(b)) indicate very good fit. Similarly, with IFI=0.983, TLI=0.978 (Table 5.8(c)) as well as RMSEA=0.029 and the 90% upper limit of RMSEA=0.048 (Table 5.8(h)), the SEM can be deemed to present a plausible explanation of the data. It is important to note that no attempt is being made to establish causality between the variables in the model. It is merely proposed that relationships exist between the variables. While theoretical arguments can be advanced regarding the most likely direction of causality, a good fit of the model should not be interpreted as support for theoretical arguments regarding causality.

Table 5.8:   Fit measures for the Structural Equation Model

Table 5.8(a): CMIN

Model	**NPAR**	**CMIN**	**DF**	**P**	**CMIN/DF**
Default model	46	125.389	107	.108	1.172

Model	NPAR	CMIN	DF	P	CMIN/DF
Saturated model	153	.000	0		
Independence model	17	1183.846	136	.000	8.705

Table 5.8(b): RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.077	.938	.911	.656
Saturated model	.000	1.000		
Independence model	.414	.492	.428	.437

Table 5.8(c): Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.894	.865	.983	.978	.982
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Table 5.8(d): Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.787	.703	.773
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

Table 5.8(e): NCP

Model	NCP	LO 90	HI 90
Default model	18.389	.000	50.460
Saturated model	.000	.000	.000
Independence model	1047.846	941.641	1161.498

Table 5.8(f): FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.600	.088	.000	.241
Saturated model	.000	.000	.000	.000
Independence model	5.664	5.014	4.505	5.557

Table 5.8(h): RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.029	.000	.048	.971
Independence model	.192	.182	.202	.000

The results of the SEM are pleasing in regard to the goodness of fit indexes, all providing values consistent with a very good fit. However, it appears that contingency theory is supported in relation only to the integration of the consolidation system, while

sophistication and formalisation do not function as mediating variables in accordance with theoretical expectations.

5.4 Conclusion

The quantitative data which has been collected by means of the self-completion questionnaires was analysed by means of both descriptive and inferential statistical techniques. Descriptive statistical analysis yielded interesting results in relation to the kind of organisation that makes use of the different types of consolidation systems and also how such systems are used in practice. This analysis also shed light on the amount of group accounting resources that are allocated to the consolidation task by companies of varying degrees of decentralisation. The slopes and the relative vertical position of the graphs indicate that significant differences exist regarding the design and usage of consolidation systems between centralised, semi-centralised and decentralised organisations.

Inferential statistics were used with the aim of making generalisations from the sample to a population. The results that were obtained from the calculation of the Pearson correlation coefficient provided support for hypotheses one to four, indicating that statistically significant positive relationships exist between organisational decentralisation, the characteristics of the consolidation system, and also the group accounting resources that are required in order to complete the consolidation at the financial year-end. These results are in agreement with the descriptive statistical analysis results, which indicated that decentralised organisations scored on average higher in relation to formalisation, sophistication and integration when compared to centralised organisations. The positive relationships between decentralisation and formalisation, sophistication and integration are also confirmed by the results of the SEM analysis.

It is particularly interesting to note that the Pearson correlation coefficient between decentralisation and formalisation is a statistically significant 0.35, which is the greatest coefficient of the three coefficients between decentralisation and the consolidation system characteristics. It was also found that the path coefficient between decentralisation and formalisation is the greatest of the SEM path coefficients between decentralisation and the three consolidation system characteristics (Figure 5.22). In other words, while integration and sophistication do have a statistically significant positive relationship with decentralisation, it is the formalisation characteristic of the consolidation system that corresponds most strongly to any increases in the extent of organisational decentralisation. This finding provides considerable support for the conclusions of other contingency studies (Bruns and Waterhouse 1975; Merchant 1981; Sharma 2002) where it was found that as organisations increase in size, it becomes progressively more difficult to control the exponentially increasing range of activities through informal mechanisms, effectively compelling such organisations to respond by becoming more decentralised and employing additional formal control devices.

It was established that the SEM fits the data very well and could therefore be deemed to present a plausible explanation of the data. The path coefficients calculated as part of the SEM analysis corresponds broadly with the Pearson correlation coefficients. While these two statistical methods differ in a number of aspects, it is noteworthy that the four Pearson correlation coefficients are consistent with the coefficients that were calculated in the SEM.

Mixed results were achieved in relation to the application of contingency theory to consolidation system: It was found that only integration functions as a mediating variable between organisational decentralisation and the resources that are required to complete the consolidation. The SEM path coefficients between formalisation, sophistication and the resources that are required to complete the consolidation were not statistically significant. It could therefore be concluded that while sophistication and formalisation are positively related to organisational decentralisation, ultimately they do not impact on the performance of the consolidation system. This conclusion is

disappointing from a theoretical perspective and requires the provision of plausible explanations for the failure of formalisation and sophistication to act as a mediating variable in accordance with the expectations of contingency theory.

The first possible explanation relates to the finding of various contingency theory studies (refer to section 2.4) that only a small percentage of the variation of organisational performance could be attributable to the interaction of the contingency factors with the organisational characteristics (Saunders and Scamell 1986). Weill and Olson (1989) applies this problem to information systems and note that the small percentage of the variation in performance originates from the questionable assumption of a positive link between effectiveness of the information system and organisational performance. They claim that even if it could be argued that an effective management information system would lead to improved organisational performance, it remains that the performance of the organisation is subject to numerous moderating variables that could swamp the beneficial effect of an effective management information system. Extending this argument to consolidation systems, it would mean that other factors, which are unrelated to the contingency factor or characteristics of the consolidation system, would influence the performance of the organisational sub-unit that performs the consolidation, resulting in ambiguous results.

The second possible explanation in relation to formalisation is derived from the mixed results that were obtained during the interviews in relation to formalisation (section 6.3.3). It was noted that while some interviewees appeared to enthusiastically accept the formalisation of the consolidation system (Interviewees 2 and 5), other interviewees resented the imposition of formal control mechanisms (Interviewees 3 and 4) and regarded it as an 'overkill'. This would suggest that some user characteristic could influence (mediate or moderate) the impact of formalisation on the resources that are required to complete the consolidation (Figure 5.23). The failure of the research model to explicitly consider the impact of user characteristics could therefore have resulted in the non-significant results that were obtained.

The lack of evidence in relation to the mediating effect of formalisation and sophistication could also be attributed to ontological issues: It was argued in chapter 4 that objectivism is the most appropriate ontological approach, since the object of the study (consolidation systems) is considered to be independent of the subject and that knowledge could be achieved when the subject discovers this objective reality. The corollary of this argument is that the characteristics of the consolidation system (formalisation, integration and sophistication) can be determined objectively without reference to the perceptions of research participants. While it is still maintained that an objective reality regarding consolidation systems does exist, it has to be acknowledged that the same consolidation system could be perceived somewhat differently by two users. For example, one user with little prior experience of consolidation systems could be impressed by the sophistication of Company X's system. Such a user would be more likely to 'Agree Strongly' with questionnaire items that attribute sophisticated features to that consolidation system, which will result in a high sophistication score. Conversely, another user with significant prior experience of other consolidation systems might regard Company X's consolidation system to be relatively unsophisticated. Such a user would be less likely to 'Agree Strongly' with questionnaire items that attribute sophisticated features to Company X's consolidation system, resulting in a lower sophistication score. In other words, the user's perception of the consolidation system could influence the formalisation, integration and sophistication scores that were obtained. It is still maintained that objectivism is the most appropriate ontological position, but it has to be accepted that the subjectivity of the user's perception regarding the characteristics of the consolidation could have resulted in the yielding of non-significant results.

Agbejule (2005) reports that under low levels of perceived environmental uncertainty, sophisticated management accounting systems exert a negative effect on performance. This result was surprising since it is expected that greater sophistication would, in all circumstances, be positively related to performance. The finding by Agbejule (2005) suggests that environmental uncertainty should be investigated to determine whether it influences the relationship between sophistication and the resources that are required to

complete the consolidation. It is contended that the omission of perceived environmental uncertainty as a mediating or moderating variable in the research could have contributed towards the non-significant results. A possible alternative research model (Figure 5.23) is presented that includes user characteristics and perceived environmental characteristics as additional variables. This alternative research model was not evaluated since no data was collected for the user characteristics and perceived environmental characteristics variables.

Figure 5.23: Possible Alternative Research Model

```
                              ┌─────────────────────┐
                              │ Integration         │
                              │  - Integrated Input │
                              │  - Integrated Output│
                              └─────────────────────┘
                                                              ┌──────────────┐
                    ┌──────────────┐   ┌─────────────────┐    │  Resources   │
┌────────────────┐  │    User      │   │ Formalisation   │    │  Required    │
│ Decentralisation│─│ Characteristics│─│  - Access Control│    │ to Complete  │
└────────────────┘  └──────────────┘   │  - Application   │    │ Consolidation│
                                        │    Control      │    └──────────────┘
                                        └─────────────────┘
                    ┌──────────────┐   ┌─────────────────┐
                    │  Perceived   │   │ Sophistication  │
                    │ Environmental│   │  - Automated    │
                    │  Uncertainty │   │    Control      │
                    └──────────────┘   │  - Inter-Company│
                                        │    Transactions │
                                        └─────────────────┘
```
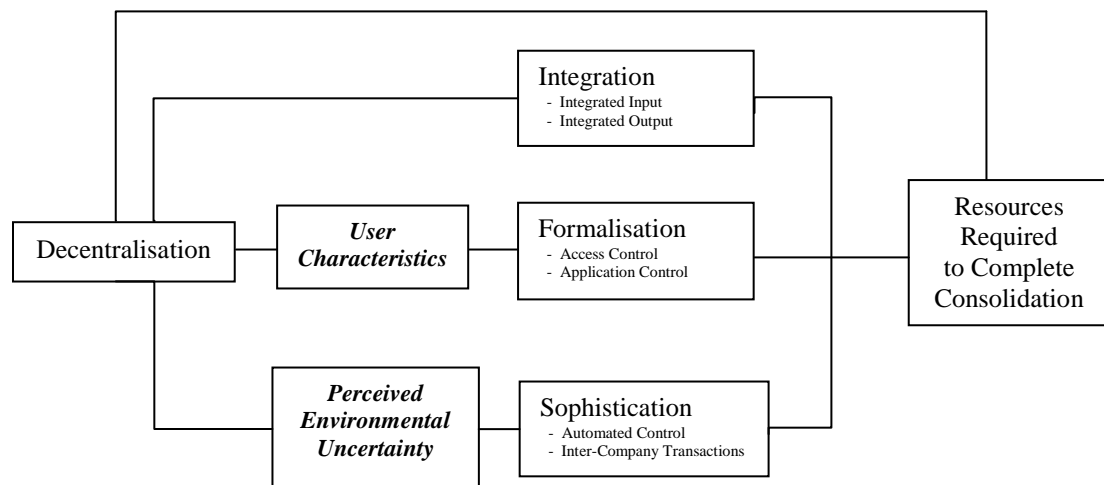
Longenecker and Pringle (1978) argue that contingency theory research often concludes with a listing and basic classification of variables without providing an explanation of the nature of the relationship between the stated variables. This criticism could conceivably be directed towards any research that adopts a quantitative methodology. Longenecker and Pringle are essentially concerned about the tendency of contingency studies to ignore the richness and complexity of the social sciences by concentrating on the statistical relationship between variables. The researcher is acutely aware of this limitation of quantitative research. A specific attempt was made to counter this criticism by including some qualitative research methods in the research design. Semi-structured interviews were conducted with the specific aim of providing

added insight into the relationship between the variables in the research model, thus offering a richer and more complete picture of the actual functioning of consolidation systems in practice. This more complete understanding of the nature of the relationships between some of the variables in the research model could potentially provide some explanations for the failure of certain relationships to return statistically significant coefficients, which were expected on the basis of the theory.

Chapter 6:
Qualitative Research Results

6.1 Introduction

It is important to note that strong statistical relationships between variables on their own do not amount to a theory (Child 1996) – a theory can only be produced if an adequate explanation of the relationships between the variables is advanced. Child (1996) advances a similar argument to that of Longenecker and Pringle (1978) by criticizing contingency studies for its tendency to find significant statistical relationships between variables without understanding the processes that underpin these relationships. Jones (1986) argues in favour of the need for case studies to be conducted on the actual functioning of accounting systems because, it is proposed, research of that nature could facilitate the further development of theories that focus on accounting systems by providing some explanations of what actually happens to accounting systems in practice. Klein and Myers (1999) argue that interpretive research could assist Information System researchers to understand human thought and action in social contexts. This research project did not make use of case studies, but the semi-structured interviews that were used are clearly qualitative in nature.

The qualitative interview is a versatile data collection method that could be appropriately used in research of all kinds, whether positivist, interpretive or critical and is one of the most important data collection tools in qualitative research (Myers and Newman 2006). The semi-structured interviews enabled a more in-depth view to be obtained regarding the functioning of consolidation systems. The semi-structured interviews were conducted with the intention of obtaining an understanding of the interaction of the variables that are contained in the research model. Semi-structured interviews are valuable precisely because a quantitative data analysis cannot capture the dynamic that exists between the research model variables.

6.2 Analysis Techniques

Eight semi-structured interviews were conducted from October to November 2008. The semi-structured interviews were recorded with the express permission of the interviewee and were subsequently transcribed. The transcriptions were read with the aim of identifying common themes or subjects. The themes listed below were identified, which include the variables that are contained in the research model (Figure 6.1), but also consist of other prominent subjects discussed during the interviews:

1. Application Type
2. Consolidation Period
3. Formalisation
4. Integration
5. Other Systems
6. People
7. Sophistication

The identification of the common themes enabled the transcribed interviews to be analysed by means of the following process:

1. Salient quotes were identified from every interview.
2. Quotes were extracted and grouped into the established interview themes. Some quotes were included in more than one group when one theme was discussed in relation to another theme.
3. An interpretive comment was associated with every quote.

This method of analysing the interviews resulted in the development of a table that was grouped according to the themes listed above and contained the following columns:

1. Interviewee.
2. Interview Quote.
3. Interview transcription page.
4. Interpretive comment.

The interview analysis table has been included in Appendix B.

6.3 Results

One important aspect of interviews that should be considered during the analysis phase is that the interview is an artificial situation. Myers and Newman (2006) point out that the interview usually involves a researcher talking to someone who is a complete stranger and that it is also often the case that the researcher intrudes upon the social setting and potentially interferes with the interviewee's behaviour. Such interference could result in answers that, while not intentionally false, are not necessarily an accurate reflection of reality. However, it should be considered that the researcher is a practitioner in the research area and was therefore not only able to understand the difficulties faced by interviewees, but were also familiar with the vocabulary of the discourse. It is suggested that the artificial element of interviews was somewhat reduced by the researcher's ability to identify with interviewees, which contributed towards a more truthful expression of opinions.

The researcher should be aware that interviewees often create answers, in other words, they rationalise behaviour or a situation. In the context of this research, rationalisations could be particularly acute if the interviewee was personally involved with the design and implementation of the consolidation system. In such a situation, the interviewee often personally associates with the consolidation system and will necessarily transfer any criticism to him/herself. This personal identification with the consolidation system by the interviewee could therefore result in attempts to enhance the perception and to rationalise certain aspects of the consolidation system.

Figure 6.1: Research Model

Independent Variable | Mediating Variable | Dependent Variable

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                    ┌──────────────────────────────────────────┐
                    │         ┌──────────────┐                  │
                    │    ┌────│  Integration │────┐             │
                    │    │    └──────────────┘    │             │
┌──────────────────┐│    │    ┌──────────────┐    │   ┌──────────────────┐
│  Decentralisation │────┼────│ Formalisation│────┼───│   Consolidation  │
└──────────────────┘     │    └──────────────┘    │   │      Period      │
                         │    ┌──────────────┐    │   └──────────────────┘
                         └────│ Sophistication│───┘
                              └──────────────┘
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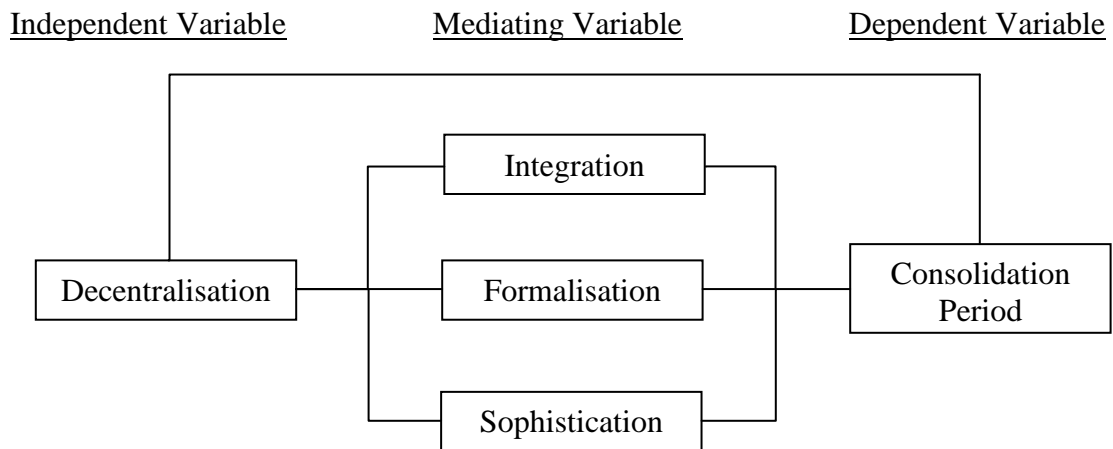
6.3.1   Application Types

This theme considers the purported rationale behind the choice of the consolidation application that was used by the interviewees during the most recent year-end process. The advantages, disadvantages and implications of the choice of the consolidation application are also considered.

Interviewees that represented companies of relatively smaller turnover identified the cost of the consolidation application as a factor that influenced the choice of the consolidation application.   Some of these interviewees acknowledged that their consolidation application was not ideal, but defended the continual use of the application on the basis of the prohibitively expensive cost of purchasing the software for a more suitable application. The company 4 interviewee pointed out that the cost of acquiring the software was but one part of the total cost of using the consolidation application, and that the cost of the design, implementation and maintenance of the

160

software should also be considered when a decision is made regarding the consolidation application that should be used. It is contended that the cost implications of consolidation applications are probably of greater relevance to companies that operate in developing countries (such as South Africa) where relatively weaker currencies render more sophisticated consolidation applications unaffordable to smaller companies. One interviewee (Company 8) conceded that their consolidation application was inappropriate for their needs and expressed a clear sense of regret that more money was not spent at the outset in order to acquire a more sophisticated consolidation application.

When interviewees were asked whether they considered the consolidation application to be appropriate for the company's needs, the question was answered by referring to the complexity of the group, in other words, the number of entities contained in, and the geographic spread of the group. Remarkably, not one interviewee explained the choice of consolidation application in terms of the turnover of the company. One interviewee (Company 7) went to great lengths to defend the use of a spreadsheet as the principal consolidation application for a group that contained 250 entities. It is significant that this fervent defense of the use of a spreadsheet was entirely unprompted. The interviewee was personally responsible for the development and maintenance of the consolidation spreadsheet and apparently developed a strong personal association with it. The interviewee acknowledged that she has been confronted regarding the appropriateness of the spreadsheet as a consolidation tool. The ardent and unprompted defense was interpreted as an implicit acknowledgement that the spreadsheet was probably not the ideal tool for the consolidation of such a complex group of companies.

The opinion of the auditors regarding the choice of consolidation application was mentioned by a number of interviewees as being of some importance. Interviewees stated that the auditors were generally not in favour of the use spreadsheets to perform the consolidation. It appears that auditors have reservations regarding the informal manner in which spreadsheets are often used to perform the consolidation, resulting in limited internal controls that could be implemented over the consolidation process.

6.3.2   Consolidation Period

The first point that should be made is that a general perception exists that, all else being equal, the consolidation of more complex groups will necessarily take longer than the consolidation of a less complex group. It is worth mentioning that, similar to the point made in the 'Application Type' section, interviewees did not indicate that the turnover of the group should be regarded as the most important factor that influences the consolidation period.

Naturally, interviewees knew how many days after year-end financial results were formally published for their company. However, somewhat unexpectedly, interviewees were also generally aware of how long their peers took to publish financial results. In some industries, for example the gold mining industry, the publication date of the financial results of each company in the industry is agreed upon in advance. The point was made by most interviewees that the date on which the financial results should be available for approval by the board of directors is set in advance. The implication is that the accountants simply have to manage the entire year-end process in order to produce a full set of annual financial statements by that predetermined date. The period that is available for the completion of the consolidation is therefore determined by the financial statement delivery date. While the complexity of the consolidation bears some influence on the period that is available to complete the consolidation, an assertion was repeatedly made by most interviewees that the consolidation period is in reality determined by the date on which the financial results have to be made available to the board of directors for consideration. The clear implication is that the consolidation system has to be designed in order to complete the consolidation by a predetermined date.

Interviewees appear to be acutely aware of the tradeoff between the relevance of the consolidated financial results – in other words, how soon after year-end the financial

results are made available – and the reliability of the financial results. Therefore, while the financial results could be delivered very rapidly after year-end (increased relevance), this could lead to some material errors being included in the financial results (decreased reliability). Accountants seem to appreciate that a longer period in which to complete the consolidation will make additional time available for the review of the consolidated financial results, which could lead to the identification of material errors.

Another factor that appears to influence the consolidation period is the quality of the data that is submitted by subsidiaries. Interviewees repeatedly complained about the time that was wasted to resolve errors that were included in the data submitted by the subsidiaries to the group for consolidation.

6.3.3   Formalisation

A perception regarding the formalisation of the consolidation process that seems to be shared by some interviewees is that it is an unnecessary bureaucratisation and will cause needless delays to the process. One interviewee referred to the internal controls that form part of the year-end process as "overkill", while the Company 3 interviewee commented, in reference to the system formalisation, that "one can normally get quickly from A to B, but they force you to go via C, which adds a lot of additional steps". This interviewee clearly felt that system formalisation was imposed ("forced") on him and that it adds unnecessary steps to the consolidation process ("go via C"). A definite feeling of resentment was detected in some interviewees towards the imposition of internal controls that are perceived to contribute towards inefficiencies in the consolidation process and add little or no value. While the perception that system formalisation will result in a protracted consolidation process appear to be generally held, the feeling of resentment was not universal amongst interviewees. Notable exceptions were the two large financial services companies (Companies 2 and 5). For example, the company 2 interviewee expressly acknowledged the value of system

formalisation by stating that "the formalisation of the system is important to the company and they are satisfied with its [current] level".

The influence of the external auditors on the consolidation system formalisation was generally acknowledged. Interviewees that use spreadsheets as the principal consolidation system were aware that the external auditors were concerned about the limited internal controls that existed in their consolidation processes. It was also apparent that some interviewees resented the role of the external auditors and expressed "irritation" (company 4) at the delay the audit caused to the consolidation process. One interviewee (company 3), who represented a company that is also listed on the New York Stock Exchange, clearly expressed his loathing of the strict internal control requirements that have been imposed on the consolidation process by the Sarbanes-Oxley Act.

A striking admission was made by one interviewee (Company 2) that the formalisation of the system is valued to such an extent that a deliberate decision was made to reduce the sophistication of the consolidation system in order to enhance formalisation. The users of their system were entirely aware of the sophisticated features of the consolidation system, but decided to manually perform certain consolidation functions, such as the elimination of inter-group transactions, with the express aim of enhancing the control over such journal entries. This interviewee perceived a tradeoff to exist between the system formalisation and sophistication, where a more formalised system will necessitate a somewhat lower level of sophistication.

6.3.4   Integration

The need for the integration of the consolidation system is generally acknowledged and welcomed, which is in sharp contrast to the apparent feelings of antipathy expressed by some interviewees towards system formalisation. Interviewees ostensibly recognised the benefits that system integration would create and stated categorically (Companies 2,

3, 5 and 7) that greater integration is expected to reduce the period of time that is required to complete the consolidation. It should be pointed out that the extent of integration varies considerably within the consolidation system: some data transfer processes are automated, while other processes within the same system require significant manual re-entering of data by accountants. For example, it was found that while the transfer of data from the GLs of each entity into the consolidation system is commonly automated, the data transfer from the consolidation system to the financial statements is almost entirely manual, resulting in the need to manually re-enter data.

During the semi-structured interviews, a perceived relationship between the system integration and the choice of the application type was pointed out. Some interviewees (Companies 1, 4 and 6) noted that all the subsidiaries in the group made use of a consistent GL application, which rendered integration straightforward. In such cases, it appears that a strong preference exists to make use of the consolidation module that forms part of some GL applications, as opposed to making use of a consolidation application that is distinct from the holding company GL. Integration is facilitated by a consistent use of a GL application across the group because the data files created by the GLs of the subsidiaries are in exactly the same format. The identical format of the data that is supplied to the consolidation application therefore makes it easy to import the data, preventing the need for manual data re-entry. In those instances where a consistent GL application is not used by all the entities in the group, it was noted (Company 2) that the ease with which the consolidation application is able to deal with the varied format of the data files that has to be processed, was an important consideration when the decision was made regarding the type of consolidation application to be used.

The apparent relationship between the consolidation system integration and formalisation was brought to light by some interviewees. It was noted (Companies 2 and 4) that when the consolidation system is not well integrated, significant additional internal controls (greater formalisation) are required in order to detect any errors that might have occurred as a result of the manual re-entry of data. Extensive

reconciliations between the GLs of the entities in the group and the consolidation system of the holding company is one internal control that is necessitated by a lack of integration.

6.3.5   Other Systems

One theme that emerged clearly during all semi-structured interviews is that the consolidation system is one system in a web of inter-connected systems. These other systems would supply the consolidation system with necessary information, or would be the recipient of information supplied by the consolidation system. Examples of other systems that are most frequently used in conjunction with the consolidation system are: a system to reconcile the inter-company transactions; an investment database where any data relating to investments in entities within the group are recorded; a system that facilitates the recording of additional financial disclosure items (such as the repayment terms of long term liabilities) that are not captured in the GLs of the consolidated entities; and a reporting system. The objective of each of these other systems is, either partially or exclusively, the production of consolidated financial statements and internal management reports. Not one interviewee actually verbalised that the consolidation system functions in this inter-connected environment, but all discussed, sometimes at great length, how other systems influence the consolidation system.

It is clear that interviewees not only considered the consolidation system to be inter-connected, but also inter-dependent: One interviewee (Company 8) remarked that other systems had to be enhanced in order to compensate for the inadequacies of the consolidation system, while another interviewee (Company 5) complained about the "significant work arounds" that are necessary to complete the consolidation process. It was admitted by some interviewees (Companies 2, 5 and 8) that changes were effectively forced on other systems because the consolidation system could not be changed. The reasons for the failure to change the consolidation system varied from lacking the necessary skills to change the consolidation system (Company 8), to inertia

(Company 2), to an inadequate understanding of the possible changes that could be made to the consolidation system in order to solve the problem (Company 5).

The level of integration between the consolidation system and these other systems is an important factor in determining the efficiency of the entire consolidation process. A failure to automatically interface the data flows between the consolidation system and these other systems will cause delays in the consolidation process and necessitate reconciliations to be performed (Company 5) in order to detect any differences.

A noteworthy implication of the influence that these other systems have on the consolidation system is that any improvements or deterioration in the ability of these other systems to support the consolidation process would influence the efficiency and effectiveness of the consolidation system. For example, assume, as is often the case, that a separate system is used to reconcile the inter-company transactions that have to be eliminated at group level. The output of this inter-company reconciliation system will be used by the consolidation system to pass eliminating journal entries. If the inter-company reconciliation system is enhanced to automatically eliminate inter-company transactions and also to automatically interface the necessary eliminating journal entries to the consolidation system, then the efficiency of the consolidation system will be greatly enhanced, even though no actual changes were made to the latter system. It is therefore critical to acknowledge that while the primary focus of this research is the consolidation system, other systems, which are strictly outside the scope of this research, do have a substantial influence on the efficiency of the consolidation system and its effectiveness in facilitating the consolidation process.

6.3.6 People

This section considers the impact that people have on the consolidation system. In the context of consolidation systems, these people will be, by and large but not exclusively, the accountants at the group level and the accountants at the entities that submit data to

the group for consolidation. The reliability of the data that was submitted to the group for consolidation was identified as a source of concern by three interviewees (Companies 2, 3, 4). Unreliable data causes delays in the consolidation process because additional reconciliations are needed in order to identify any possible errors. All three interviewees attributed the unreliable data to the poor quality of the accountants at the entities that submit data to the group for consolidation: The interviewee that represented company 2 simply stated that "the understanding of the accountants out there is not up to scratch". The importance of competent accountants that possess up-to-date knowledge is particularly relevant due to the frequent changes that are made to accounting standards. It is often the case that accountants received their education when one set of accounting standards were in place. Parts of their knowledge would then be rendered out-of-date by subsequent changes to certain accounting standards. Two interviewees (companies 2 and 5) stated that a significant amount of time and money was spent on the education of accountants throughout the group in order to improve the understanding of the changes that were made to the South African accounting standards as a result of the adoption of International Financial Reporting Standards (IFRS). It should be noted that all the interviewees were group accountants and were therefore in a position to comment on the perceived quality of the accountants that submit data to the group for consolidation. However, the interviewees were clearly not able to objectively comment on their own quality and ability to effectively support the consolidation process. It can safely be assumed that the impact of the quality of group accountants on the consolidation process is equally, if not more important than the quality of the accountants that submit data to the group for consolidation.

The interviewee that represented company 2 pointed out that staff training is also necessary in order to make accountants at the group entities aware of the way in which their actions impact on the consolidation process. This interviewee mentioned that a properly designed training programme, that involves some time spent at the corporate head office, contributes towards an improved understanding by these accountants of the processes that group accountants have to complete in order to produce the consolidated

financial statements. Such a training programme will also enable the accountants at the entities to appreciate the implications of their accounts on the consolidation process. The company 8 interviewee admitted that no formal consolidation system training is provided to new accounting personnel. The lack of a formal training programme causes only the basic functions of the consolidation system, which is truly essential to its proper functioning, to be taught to new accounting personnel. Such an informal transfer of knowledge not only has the potential to perpetuate undesirable practices, but is also likely to result in a failure to utilise many potentially useful functions of the consolidation system, thereby limiting the system's sophistication.

It is clear that people significantly impact the ability of the consolidation system to facilitate the consolidation process. The education and training of accountants appears to be an important consideration for participants and that considerable resources are allocated to these activities in the anticipation of improving the ability of accounting personnel to make proper use of the consolidation system. The failure to employ competent accountants who are adequately trained can lead to an inability to understand the manner in which the consolidation system functions, which will then result in an over-reliance on external consultants to perform even the most basic system maintenance and development activities. Such a situation appears to exist at Company 8, the interviewee of which admitted that the consolidation system is regarded as a "black-box" which is not understood, and that even a straightforward function, such as the addition of an account to the chart of accounts, has to be performed by the external consultant.

6.3.7   Sophistication

It emerged clearly that some interviewees (companies 1 and 2) considered sophistication as a tool that could be used to reduce the amount of human resources that are required to complete the consolidation process. Interviewees were entirely aware that increasing levels of consolidation system sophistication could be obtained by

allocating either an employee or external consultant to the task. However, it appears that, for a number of reasons, some companies decided not to enhance the sophistication of the system. The company 8 interviewee acknowledged, in relation to a specific system enhancement, that "this could be a substantial benefit, but we have not spent time or money on this."

It seems that inertia was the primary reason for not enhancing the sophistication of consolidation systems. Companies realised that the consolidation system might lack certain elements of sophistication, but they were comfortable with the manual work that was necessary to overcome the system's deficiencies. However, some interviewees seem to have made a conscious decision not to enhance the system because the potential benefits that were expected to be derived from a system change could not be justified by the expected cost of such a change. Confirming this notion, the company 2 interviewee stated that "from our point of view, we would not receive a great deal of benefit from quite significant changes we would have to make to the system".

Certain interviewees (companies 1, 2 and 8) decided against system sophistication enhancements due to the high level of perceived risk that is involved in such a change. Both companies 1 and 2 mentioned that they are currently in a period of corporate change during which new companies are acquired. Change to the consolidation system is minimized during this period in order to provide some stability to the consolidation process. Changes to the corporate structure complicate the consolidation process. It is therefore prudent to delay sophistication enhancements, if at all possible, because such changes are likely to contribute to system instability during the change process. The statement by the company 2 interviewee that "our group structure changes often and the accountants prefer to make these consolidation entries manually", could be interpreted as an admission that some reservations exist relating to the accuracy of the automated calculation of consolidation entries during periods of corporate change. It has been found that when a system change coincides with changes to the corporate structure, accountants find it exceptionally difficult to determine whether changes to the

consolidated results are attributable to the system change, or the corporate change, or both.

It is interesting to note that five interviewees (companies 1, 2, 3, 5 and 8) identified issues that could be resolved by means of sophistication enhancements as the most significant consolidation system challenge. All of these interviewees, except the company 8 interviewee, named the inter-company transaction reconciliation process as the greatest difficulty in the consolidation process. They also realised that solutions could be developed to automate a significant part of this reconciliation process, which would greatly reduce the extent of manual work that is necessary for its completion.

It is worth repeating that a relationship between the sophistication and formalisation of the consolidation system seems to exist. It was mentioned in the formalisation section of this chapter that one interviewee admitted to purposefully reducing the sophistication of the consolidation system in order to enable greater system formalisation.

Interviewees were cognisant of an apparent relationship between the sophistication and the complexity of the consolidation system. It was recognised that the consolidation system will necessarily become more complex when the level of sophistication is increased. Greater levels of system complexity are caused by additional automated calculations that are a byproduct of sophistication. Increased system complexity could result in more opportunities for values to be calculated incorrectly, particularly if the organisation does not maintain the system adequately and/or if it fails to retain a detailed understanding of the manner in which the system performs calculations. Such a situation appears to exist at company 8, the interviewee of which admitted that the system "certainly does not function exactly as expected" and that they "are dependent on a consultant, who is the only person that can fix any system problems".

6.4 Conclusion

Kaplan (1984) argued that a need exists "to muck around with messy data and relationships" in the context of accounting systems. Jones (1986) states that such a 'mucking around' will lead to a rapid realisation by the researcher that the technical niceties of accounting systems, as described in textbooks, are modified in real organisations; and that accounting systems are immersed in social and political issues that present a rich and complex tapestry. The semi structured interviews presented the researcher with an opportunity to 'muck around' with the intricate relationships that exist in the context of consolidation systems. These relationships were certainly bewildering at first, but a systematic approach to the analysis of the semi-structured interviews enabled the creation of some form of order. While the qualitative part of this research does not enable one to conclude with certainty whether a relationship exists between variables, it does provide a much richer and complete picture of how such relationships are perceived to function in practice. The analysis of the relationships between the variables in the research model was of great value and helped to create an understanding of the richness of the actual functioning of consolidation systems that would not have been possible by means of a strictly quantitative analysis of data.

One of the principal conclusions reached as a result of the semi-structured interviews analysis was that both other systems and people exert a considerable influence on consolidation systems. It was found that participants regarded the consolidation system to be one system in a web of inter-connected systems and that any improvements or deterioration in the ability of these other systems to support the consolidation process would influence the efficiency and effectiveness of the consolidation system. Interviewees also suggested that people have a significant impact on consolidation systems. In this context, accountants require education, training and up-to-date knowledge of accounting standards. Companies cannot expect a consolidation system

to perform to its optimum potential when accountants are employed who lack the proper education, training and experience.

Myers and Newman (2006) point out that, during an interview, which in most cases involves an interaction between two strangers, the researcher is essentially asking the interviewee to create answers. It is the opinion of the researcher that, particularly in relation to the consolidation system formalisation, interviewees initially created answers to questions that they thought were expected of them, but that these answers were not necessarily a truthful reflection of their perceptions. However, upon further probing, it transpired that, in some instances, more negative, and in all likelihood, more honest feelings towards the formalisation of the system were expressed.

Decisions to make changes to the consolidation system are, at least partially, based on perception. Estimates of the costs and benefits of system changes are based on these perceptions and are often significantly over or understated, which could lead to incorrect decisions. However, it was found that some interviewees avoided making these decisions since they prefer to continue with the established system. It is concluded that inertia is a strong force in the context of consolidation systems, which gives rise to numerous glaring system inefficiencies that could be corrected in a cost effective manner.

Chapter 7: Conclusion

7.1 Conclusions and Implications

The principal objective of this research was to obtain an improved understanding of consolidation systems by means of a systematic enquiry of the design and use of these systems by companies that are listed on the Johannesburg Stock Exchange (South Africa). A significant body of research suggests that accounting information systems should be designed in accordance with the contextual variables surrounding the company. This research adopted such an approach and aimed to determine whether contingency theory could be applied to consolidation systems and, if so, which contingency factors are most likely to influence the design and use of consolidation systems.

In accordance with Ittner and Larcker's (2001) call for the utilisation of multiple data sources to develop a consistent body of evidence, two distinct approaches to the collection of data was used: questionnaires to obtain quantitative data and semi-structured interviews to collect qualitative data. The quantitative data was analysed by means of descriptive and inferential statistical methods. The descriptive statistical methods were employed in order to organise, summarise and describe the quantitative data. The inferential methods were used to examine hypotheses and appraise a research model to determine whether contingency theory could be applied to consolidation systems. While survey based research is useful for the identification of broad trends and the existence of specific features of consolidation systems across a large number of organisations, it has to be accepted that such a data collection method precludes a deeper investigation of the issues that are encountered at an organisational level (Woods 2009). The qualitative data collected by means of the interviews, offered not only some support for the conclusions reached on the basis of the quantitative data analysis, but also provided a more in-depth understanding of social issues and practical realities that this type of accounting system has to address.

It is contended that the findings of this research provide some support for contingency theory's central tenet of no universally appropriate consolidation system. Substantial benefit was obtained from the application of two approaches to data collection, which enabled the research to develop a conceptual framework for the examination of consolidation systems. It appears that no prior academic research has specifically considered consolidation systems and as such, this conceptual framework provides a starting point for further research, particularly as this type of accounting system gains in prominence due to regulatory changes.

Otley (1985) stated that contingency theory should not be expected to provide a total design prescription, but that it probably is capable of providing significant insight into the major design contingencies. This claim by Otley appears to be a realistic assessment of the capability of contingency theory as a theoretical framework. It is contended that contingency theory was an eminently useful tool to facilitate this systematic enquiry and provided considerable insight into the manner in which consolidation systems are designed and used in practice.

Table 7.1: Research Hypotheses Not Rejected

H1	Greater organisational decentralisation is positively related to consolidation system integration.
H2	Greater organisational decentralisation is positively related to consolidation system formalisation.
H3	Greater organisational decentralisation is positively related to consolidation system sophistication.
H4	Greater organisational decentralisation is positively related to the group accounting resources required to complete the consolidation.

7.1.1 Decentralisation

Organisational decentralisation was clearly identified by all the different methods of analysis as an important factor that should be considered when a consolidation system is designed. The average scores obtained by the decentralised entities in respect of formalisation, sophistication and integration were noticeably greater than the average scores obtained by the centralised entities (Chapter 5 - Figures 5.17; 5.18 and 5.19). This apparent trend identified by means of the descriptive statistical analysis was confirmed by the positive Pearson correlation coefficients (resulting in the support for Hypotheses H1 to H3 – Table 7.1) and the positive SEM path coefficients between decentralisation and the three characteristics of the consolidation system. The importance of decentralisation was also acknowledged by interviewees: when asked whether they considered the consolidation system to be appropriate for the organisation's needs, all interviewees answered the question by ultimately referring to the number of entities within the organisation. Not one interviewee explained the choice of consolidation system in terms of the turnover of the company or any other contextual factor. There is also considerable agreement between the results obtained from the qualitative and quantitative analysis regarding a relationship between decentralisation and the resources that are required to complete the consolidation. It was mentioned by almost all interviewees that greater organisational decentralisation was expected to increase the amount of resources that were required to complete the consolidation. This finding was corroborated by the positive Pearson correlation coefficient (resulting in the support for Hypothesis H4 – Table 7.1) and the positive SEM path coefficient between decentralisation and the resources that were required to complete the consolidation.

This unanimous agreement between the results obtained from the Pearson correlation analysis and the SEM analysis, and also between the qualitative and quantitative analysis regarding the relationships of decentralisation with all the other variables in the research model, provides a consistent body of evidence regarding the pervasive influence of organisational decentralisation as a contingency variable in the context of

consolidation systems. It can therefore be inferred that organisational decentralisation should be regarded as a fundamental contingency in the design of a consolidation system.

7.1.2   Formalisation

One of the surprising findings of this research is the complexity of the formalisation construct in the research model: It was observed during the interviews that the larger companies placed greater emphasis on formalisation, while smaller companies resented formalisation and considered it unimportant and something only the auditors were concerned about. The SEM path coefficient from decentralisation to formalisation with a value of 0.484, also indicates a positive relationship between the two variables. One notable difference between the results obtained by means of the quantitative and the qualitative methods relates to the effect of formalisation on the period that is required to complete the consolidation: Interviewees were of the opinion that greater system formalisation will necessarily result in a longer consolidation process. However, Figure 5.19 indicates that centralised, semi-centralised and decentralised organisations that are 'fast' publishers of their financial data, obtained higher average formalisation scores than organisations that are 'slow' publishers. In other words, the descriptive statistical analysis suggests that greater consolidation system formalisation is associated with organisations that publish their financial information more rapidly, which would suggest that their consolidation process would also have been completed in a shorter period of time. This apparent trend is contrary to the sentiment expressed by many interviewees, who believed that consolidation system formalisation will result in a protracted consolidation process. This inconsistency indicates that formalisation should be further explored, possibly with the aim of discovering another variable that mediates or moderates formalisation's relationship with the resources that are required to complete the consolidation.

7.1.3   Integration

Interviewees ostensibly recognised the benefits that system integration would create and stated categorically (Companies 2, 3, 5 and 7) that greater integration is expected to reduce the period of time that is required to complete the consolidation. The general willingness to accept integration stands in sharp contrast to the feelings of antipathy expressed by some interviewees towards system formalisation. These observations regarding integration are corroborated by the negative SEM path coefficient between integration and the resources that are required to complete the consolidation (Table 5.6), indicating that greater integration is associated with a smaller amount of consolidation resources. It was noted that integration was the only consolidation system characteristic that acted as a mediating variable – formalisation and sophistication obtained statistically insignificant SEM path coefficients. While this finding was naturally somewhat disappointing from a theoretical point of view, it is nevertheless of significance. The implication is that enhancements to the system's level of integration should be the primary focus for practitioners if attempts are made to reduce the resources that are allocated to the consolidation process.

7.1.4   Sophistication

Interviewees considered sophistication as a tool that could be used to reduce the amount of resources that are required to complete the consolidation process. However, despite this professed opinion, it emerged that, for a variety of reasons, interviewees were reluctant to implement sophistication enhancements. Some of these reasons related to inertia, a high level of perceived risk associated with such system changes, and the perceived reduction in system formalisation that would be associated with a more sophisticated consolidation system. The reluctance to implement sophistication enhancements created some doubt regarding the conviction of interviewees in relation to the beneficial effect of a sophisticated consolidation system. This ambivalence appears to be supported by the descriptive statistical analysis: Figure 5.17 indicates

that the average sophistication score obtained by centralised organisations that publish financial information *fast* (value = 94) was actually lower than the average sophistication score of centralised organisations that publish financial information *slowly* (value = 100). Equally, regarding decentralised organisations, there was very little difference between the average sophistication score of *slow* publishers (value = 108) and *fast* publishers (value = 111) of financial information. In other words, no clear association was detected between the level of the consolidation system sophistication and the speed at which financial results are published. This apparent lack of a relationship between sophistication and the resources that are required to complete the consolidation was also encountered during the SEM analysis, where it was found that a statistically significant path coefficient could not be derived. The results of the diverse analytical methods lead to the conclusion either that the beneficial effect of a sophisticated consolidation system is non-existent or insignificant; or that the inclusion of an additional variable in the research model should be considered in order to provide a more cogent view of the role of consolidation system sophistication.

7.1.5   Resources Required to Complete the Consolidation

The results that were obtained from the calculation of the Pearson correlation coefficient provided support for hypotheses H4 (Table 7.1), indicating that statistically significant positive relationships exist between organisational decentralisation and the group accounting resources that are required to complete the consolidation at the financial year-end. It was also found that only integration functions as a mediating variable between organisational decentralisation and the resources that are required to complete the consolidation.

Claiming that a properly designed and used consolidation system has a significant impact on an organisation's ability to perform a rapid consolidation does not imply that it is the *only* factor that contributes substantially towards this ability. It emerged very clearly from an analysis of the interviews that non-system issues exert a strong

influence on the ability of the consolidation system to facilitate the consolidation process. The accountants that are employed by the organisation, both at the reporting entities and at group level, were identified as being particularly important in this regard. Interviewees also repeatedly alluded to the notion that the consolidation system functions in a web of inter-connected systems, implying that such systems influence the effectiveness and efficiency of the consolidation system. These non-system issues have the potential to exert considerable influence on the performance of the consolidation system, which will consequently also impact the organisation's ability to complete the consolidation with reduced resources. It is therefore proposed that the non-system issues that were not quantitatively measured in the research model could have contributed towards a distortion of the research findings. This distortion could have been part of the cause for the failure of formalisation and sophistication to act as mediating variables in accordance with theoretical expectations.

The model adopted by this research measured the performance of the consolidation system by means of the amount of resources that are required to complete the consolidation. However, it should be acknowledged that enhancements to a consolidation system are not made with the sole purpose of reducing the resources that are required to complete the consolidation. The reasons for system enhancements vary, but it has been found that the desire to improve the reliability of financial information is often advanced as a reason for spending money on the consolidation system. Interviewees appear to be acutely aware of the tradeoff between the relevance of the consolidated financial results (how soon after year-end the financial results are made available) and the reliability of the financial results (the absence of material errors). The delivery of financial results soon after year-end (increased relevance) could therefore lead to the inclusion of material errors in the financial results (decreased reliability). Interviewees seem to appreciate that a longer period in which to complete the consolidation will make additional time available for the review of the consolidated financial results, which could lead to the identification of material errors. It is therefore possible that while the consolidation system might be able to facilitate a rapid completion of the consolidation process, group accountants might deliberately choose

to complete the consolidation over a longer period of time in order to spend more time on the review and analysis of the financial information, with the aim of improving the reliability of the system's output. The corollary is that a consolidation system that is highly sophisticated, integrated and formalised might have required a relatively greater amount of resources to complete the consolidation process, precisely because significant resources were expended in order to enhance the reliability of the financial information. However, the reliability of financial information is difficult, if not impossible to measure reliably. The implication of this line of reasoning is that the value of the research model's independent variable (the resources that are required to complete the consolidation) could have been distorted due to variations in the reliability of the consolidation system's output. This could have contributed towards the mixed results that were produced from the SEM analysis.

7.1.6   Fit

Contingency theory implicitly assumes that managers act with the intention of adapting their accounting systems in order to improve the fit with the contingencies, which is then expected to yield enhanced performance. Some support for this assumption was found in the apparent awareness of interviewees of the general direction in which their consolidation system should be changed in order to improve the system's fit with the contingency variables: Interviewees did not know exactly what would constitute a good fit, but they did seem to know whether their consolidation system required greater formalisation, integration and sophistication, or whether these three characteristics were at an appropriate level for their circumstances.

One theme that emerged clearly from the analysis of the interviews was that the date on which the financial results should be finalized is actually mandated by the board of directors. The corollary is that the consolidation system has to be designed in order to facilitate the completion of the consolidation by a predetermined date. This would

imply that the resources that are required to complete the consolidation – calculated by multiplying the number of days that are available to complete the consolidation process with the number of group accountants – actually determine the consolidation system's sophistication, integration and formalisation. In other words, the resources that are required to complete the consolidation is the independent variable, while sophistication, integration and formalisation are dependent variables. This notion is contrary to theoretical expectations but appears to receive some level of support from the descriptive statistical analysis: various figures in chapter 5 (Figures 5.16 to 5.19) indicate that the speed with which organisations publish financial results (slow, medium, fast) is associated with considerable variation in the scores obtained in regard to other variables. Stated differently, the speed with which the board has decided to publish the financial results appears to be associated with considerable variation in certain characteristics of the consolidation system. It is not claimed that the publication speed of the financial results causes the variation in the consolidation system characteristics, but merely that an association seems to exist which warrants further investigation.

7.2 Contributions

Academic researchers often stand accused of lacking relevance to managerial practice and of too narrow a discipline base (Starkey and Madan 2001). This research attempted not only to meet the requirements of rigorous academic research, but also aspired to be relevant. Relevance implies that research should be valued by both academics and practitioners and should contribute towards an enhanced understanding of an issue. This research project endeavoured to make a worthwhile contribution to the field of accounting information systems, but it has to be acknowledged that the components of this contribution vary in their extent.

7.2.1 Contribution to Theory

Management accounting information systems is the most common type of accounting system to which contingency theory has been applied. Financial accounting systems appear to be a less frequent focus of contingency theory studies, with Thomas (1986, 1991) being one of the few exceptions. Consequently, the contribution made towards the advancement of theoretical knowledge is regarded to be primarily that of extending a theoretical framework, which has been widely applied to other types of accounting systems, to that of a relatively new type of accounting system – consolidation system. The contribution made in regard to the empirical evidence that has been collected could also be deemed to be an extension of the extant body of evidence since numerous other studies have performed empirical research on accounting information systems, but not exclusively on consolidation systems.

A systematic review of the literature revealed in a single academic article that specifically considered consolidation systems. The research on which Sasso's (1988) article was based was limited in its scope: the consolidation systems of five large multinational companies based in the United States were scrutinised. Nevertheless, Sasso's article provided meaningful insights into aspects of consolidation systems that were considered relevant at the time of its publication, despite its restricted scope. This dissertation therefore makes a meaningful contribution since no other publicised academic research which specifically considers consolidation systems was conducted in the intervening years. The contribution of this dissertation is also meaningful since the scope of this research was considerably broader – having examined 210 companies of various sizes that operate in a range of industries. The combination of quantitative and qualitative methods employed by this research also makes a meaningful contribution to the field of accounting information systems in general, and consolidation systems in particular. It is proposed that the combination of these two methods provided valuable insights that would not have been generated by using either of the two methods in isolation.

This research could also be viewed as an enquiry into the validity of consolidation systems as a coherent empirical construct. The extent to which the hypotheses in this research model have received empirical support provides some confirmation of the notion that consolidation systems could be examined as a cohesive construct in a meaningful way.

Contingency research is often criticised for failing to include the performance of the organisation or the organisational sub-system as a distinct variable in the research model (Gordon and Miller 1976). It is the opinion of the author that such a failure results in a loss of the richness (and potentially also the benefit) of contingency theory. This research specifically considered the performance of the consolidation system as an independent variable, be it with somewhat mixed results. The research model could conceivably have omitted consolidation system performance as an independent variable and focused solely on the relationships between the contingency variable and the characteristics of the consolidation system. However, the absence of this important variable would have reduced the value of the findings and deprived the research from yielding potentially insightful conclusions. It is proposed that the inclusion of the consolidation system performance as a variable in the research model amounts to a noteworthy contribution to the field of contingency studies.

Waterhouse and Tiessen (1978) criticise certain contingency studies, such as Child (1973), for making use of inappropriate measures of performance. One valuable theoretical contribution of this research is the novel manner in which the performance of the consolidation system was measured. The performance of information systems is typically operationalised by means of perceptual measures such as user satisfaction (Ives, Olson et al. 1983), system success (Martin 1982), or the extent of system use (Lucas 1975; Ginzberg 1979). This study measured the performance of the consolidation system by calculating the resources that were required to complete the consolidation during the year-end process. This is an innovative performance measure that is considered to be the most appropriate for the purposes of this research.

Child (1996) criticises contingency studies for their tendency to find significant statistical relationships between variables without understanding the processes that underpin these relationships, while Longenecker and Pringle (1978) lament about the frequency with which studies that adopt this theoretical framework simply conclude with a basic listing and classification of variables. These authors argue that an investigation into the nature of the relationship between the stated variables would be of much greater value. This research endeavored to obtain such an understanding, principally by means of the semi-structured interviews. The identification of the variables that constitute the research model is naturally of some value, but it is contended that one of the most important contributions of this research is the insights that were provided into the nature of the relationships between the variables.

Gerdin and Greve (2004) argue that contingency based research often makes use of different forms of fit and that researchers have not always been aware of the implications of their choice on theory building and methodology. Venkatraman (1989) also argues that the role of fit in contingency type research has been severely handicapped by the absence of appropriate links between the theoretical concept of fit and the statistical techniques that are used to test the constituting relationships. Venkatraman (1989) concurs with other authors (Hartmann and Moers 1999; Sharma 2002; Chenhall 2003; Cadez and Guilding 2008) that SEM is the most appropriate statistical technique for the examination of a mediated relationship between dependent and independent variables in a contingency study. Yet, despite the general consensus that has emerged regarding the appropriateness of SEM in certain contingency studies, it appears that this sophisticated statistical method is often not utilised. It seems that the fairly large sample sizes (recommended minimum of 100) required by SEM for reliable analysis is one of the principal reasons for the failure to use this technique when it would otherwise have been appropriate. The sample size of this research project was 210, which enabled the reliable application of SEM. The use of SEM as a statistical technique could therefore be regarded as a valuable contribution to the field of contingency studies, since its application is often appropriate but not always

possible. This research therefore contributes towards that distinct body of contingency based research where SEM is appropriate and where it could be reliably applied.

In the course of conducting this research, the development of three latent variables was necessary in order to measure the consolidation system's level of sophistication, formalisation and integration (refer to section 4.4). While these three variables have been used extensively in academic research that considered management accounting systems, they have never been developed in the context of consolidation systems. The process by which these variables were developed has been explained in section 4 of the methodology chapter (Chapter 4) and their construct validity was subsequently confirmed by means of a confirmatory factor analysis. It is proposed that a meaningful original contribution has been made by developing these valid latent variables, which could be used and possibly refined by future research.

7.2.2 Contribution to Practice

This research attempted to make a contribution to practice by being relevant to practitioners. The actual and perceived independence of the researcher contributed towards the relevance of the research: Organisations that develop accounting software applications perform commercial surveys from time-to-time. The results of these surveys are often made available to customers. However, customers naturally doubt the objectivity and integrity of the findings and regard such reports as sophisticated marketing material. The output of this research has not been used for the purpose of promoting one particular consolidation system and, as a result, it is anticipated that the research findings will be perceived to be unbiased, thereby enhancing its relevance.

Practitioners were widely consulted prior to the finalisation of the research proposal. The suggestions of these practitioners were incorporated into the research design, particularly in relation to the inclusion of additional items in the questionnaire that were

not strictly necessary for the evaluation of the research model. The data obtained from these questions proved to be particularly interesting and useful to practitioners.

Upon completion of the data analysis, the research results were documented in a report that was sent to every participant. These reports included not only extracts from the general research results, but also indicated how each participant performed relative to the entire research sample. An example of a participant research report and the accompanying e-mail has been included in Appendix E. Significant positive feedback was received from practitioners regarding the participant research reports. It is maintained that the relevance of this research to practitioners was enhanced as a direct result of the distribution of these reports.

The South African Institute of Chartered Accountants (SAICA) provided an endorsement of this research (endorsement letter included in Appendix D). The initial results of the research were presented to some of the SAICA directors, which were received with considerable enthusiasm. It was requested that these results be presented during a public lecture that should be open to all the research participants and members of SAICA. This public lecture was held on 1 April 2009 at a conference venue in Johannesburg, South Africa, and was attended by 85 individuals. The official invitation to the lecture that was distributed to all the research participants and SAICA members has been included in Appendix G. At the conclusion of the lecture, attendees were asked to complete an anonymous evaluation form. SAICA compiled the results of the evaluation and made it available to the researcher (Table 7.2).

Table 7.2: Public Lecture Evaluation

Component Evaluated	%
Subject Knowledge	91
Presentation Style	80
Interaction with audience	78
Overall Impression of the event	83

The public lecture was arranged with the express purpose of enhancing the relevance of the research findings to practitioners. The 91% obtained (Table 7.2) in relation to the subject knowledge of the presenter could be interpreted as conferring a degree of validity to the research findings since participants would have been likely to rate this aspect of the presentation considerably lower if spurious research findings were presented. The relevance of the research findings could be inferred from the fact that the public lecture was well attended and that the overall impression of the event was rated positively (83% - Table 7.2) by an informed group of attendees. The presentation of the research findings to participants and other interested parties should be considered a definite contribution to practice.

An article that contained extracts from the research results was published in the March 2009 edition of the "Accountancy SA", a monthly practitioner journal that is distributed to all South African Chartered Accountants. The confirmed circulation of the February 2009 issue of the journal was circa 33,000. The article was included as a 'cover feature' of the journal and received considerable emphasis. The actual article that was published has been included in Appendix F. Scanned portions of the journal have been included in Appendix F to demonstrate the prominence of the article in that issue of the journal.

Feedback received from attendees to the public lecture and the article published in the "Accountancy SA", indicated that the analysis performed in relation to the circumstances under which certain types of consolidation systems are appropriate was of particular relevance. The interest in this aspect of the research further enhances the importance of the identification of organisational decentralisation as a definite contingency variable. The notion that spreadsheets are not an appropriate consolidation application for decentralised organisation, appeared to evoke the most response: while most people agreed wholeheartedly with such an argument, certain individuals, particularly representatives of decentralised organisations that do make use of spreadsheets as the primary consolidation application, vehemently defended their

position. It emerged that, by and large, research participants and public lecture attendees wanted to:

- Obtain confirmation of the appropriateness of the consolidation application that their organisation currently uses.

- Establish what types of consolidation applications are widely used in South Africa that could be considered as viable options if a new consolidation system should be required.

- Obtain an enhanced understanding of the factors that should be considered to determine which particular consolidation application should be judged most appropriate to their organisation.

In the past, organisations that wished to acquire a new consolidation system would have been forced to rely principally on the marketing material of companies that develop and distribute consolidation applications, in order to inform their decision. It is proposed that the independence of the researcher and the objective manner in which this research results were presented, provided organisations, for the first time, with impartial information on which to base decisions relating to the acquisition of a consolidation system. The provision of previously unavailable impartial information should be regarded as an important contribution of this research to practitioners.

In recent years, governance reforms, such as the Sarbanes-Oxley Act in the United States (2002), the Basel II Capital Accord and the revised Combined Code (2003) in the UK, aimed to minimise the risk of major corporate failures by means of tighter regulation of internal control systems (Woods 2009). Consequently, the internal control environments of organisations have received increased attention, which has contributed towards the greater prominence of the internal controls that form part of the consolidation phase of the year-end process. It is proposed that the exploration of consolidation system formalisation as a variable in the research has contributed towards an improved understanding of the internal control environment of the year-end process. This product of the research should be regarded as an important contribution to practice, particularly since an enhanced understanding of the internal control

190

environment could play a part in reducing the risk that is associated with the year-end process.

One of the most significant benefits that are expected to emerge from an enhanced understanding of consolidation systems is an improvement in the fit between the information requirements of the system users and the information delivered by the system. Such an improved fit is likely to contribute towards greater efficiency of the consolidated financial statements preparation process. A properly installed system commonly results in reduced information processing requirements by its users, allowing them more time to scrutinise the data for possible errors, which in turn increases the likelihood of errors being discovered in the financial information. The reduced data processing requirements placed on users also decreases the extent to which they have to work an excessive number of hours over the financial period-end. A reduction in the necessity for excessive overtime will reduce staff fatigue, making it less likely that unnecessary errors will be made in the preparation of financial information. Company managers often criticise accountants for focusing solely on 'crunching the numbers' while neglecting the analysis and interpretation of the financial results. A consolidation system that performs most of the 'number crunching' will enable accountants to perform meaningful analysis on the financial information, thus adding real value to their function.

It is expected that, from a practitioner perspective, this research will provide considerable insight into the relative importance of the three characteristics of consolidation systems: It has been the experience of the researcher that excessive emphasis is placed on the sophistication of the consolidation system during the design phase of implementation projects, often at the expense of the integration and formalisation characteristics, in the implicit belief that sophistication would provide the greatest relative benefit. This research has shown that, of the three characteristics that have been included in its scope, integration, and to a lesser extent formalisation, is more likely than sophistication to be associated with a reduction in the amount of resources that are required to complete the consolidation at the year-end. As a result,

practitioners have been provided with evidence of the benefits that are expected to be derived from greater emphasis being placed on the integration and formalisation characteristics of the consolidation system. It is anticipated that the dissemination of the research findings will contribute towards some change in behaviour of practitioners in respect of the design of consolidation systems.

7.3 Future Research

No prior academic research could be found that solely examined consolidation systems. This research advanced a conceptual framework that could be used to consider such systems and also provides a starting point for further research, particularly as this type of accounting system gains in prominence due to regulatory changes. A natural progression from this research would be an examination of other characteristics of consolidation systems and how such characteristics vary in different organisational and environmental conditions. One particular development that would warrant investigation is the widespread adoption of Extensible Business Reporting Language (XBRL). XBRL is a standards-based system of communicating business and financial information that is being mandated by regulators in all significant financial markets, which will require consolidation systems to report information in a standardised manner.

This research focused on the consolidation systems that are used by companies that are listed in South Africa. It is anticipated that additional insights would be obtained if an equivalent study was conducted in the context of a developed economy. A study that compares the manner in which consolidation systems are designed and used between countries would also be beneficial, particularly if the two countries are at different levels of economic development.

This research has been conducted as part of the significant body of contingency based research. The examination of consolidation systems from a contingency theory

framework would gain by extending the contingencies that were included in this study from organisational decentralisation, to other popular contingencies such as societal variables; the environment of the enterprise; and user characteristics. It is expected that regulation would be an interesting contingency factor to consider, particularly in relation to its impact on the formalisation of the consolidation system. Another factor that could be considered in a contingency study of consolidation systems is the actual or perceived quality of the financial results. While this contingency study measured the performance of the consolidation system by means of the amount of resources that are required to complete the consolidation, another valid measure of the system performance could be the quality of the consolidated financial results. The measurement of data quality would be problematical, but the variable could be estimated by questioning auditors and users of the financial information regarding their perceptions of the quality of the financial results.

Contingency theory provided valuable insights into the manner in which consolidation systems are designed and used, but it has to be acknowledged that other theoretical frameworks could also provide useful vantage points from which to consider such systems. The area of psychology could be used to create a multifaceted understanding of consolidation systems. Such research has attempted to identify individual characteristics such as personality or cognitive style that affect the way individuals react to different aspects of accounting systems (Chenhall 2003). Of particular interest would be an investigation into the possible reasons for and effect of the feelings of resentment and antipathy expressed towards the formalisation of the consolidation system. Such a study could include an evaluation of the possible mediating or moderating effect of user attitudes in relation to system formalisation.

Jones (1986) notes that repeated references have been made in the literature regarding the need for case studies of the actual functioning of accounting information systems (Kaplan 1984). Such studies could facilitate the development of new or the refinement of existing theories with regard to accounting systems. While this research made of use some qualitative methods, it is anticipated that case studies of the actual manner in

which consolidation system are used during the financial year-end process would yield significant insights. However, it is anticipated that the length and the level of access that would be require during such a busy period for accountants will pose sizeable obstacles to the successful completion of case studies.

References

Abernethy, M. A., W. F. Chau, et al. (1999). "Research in Managerial Accounting: Learning from Others' Experiences." Accounting and Finance **39**(1): 1 - 27.

Agbejule, A. (2005). "The relationship between management accounting systems and perceived environmental uncertainty on managerial performance: A research note." Accounting and Business Research **35**: pp. 295-305.

Albaum, G. (1997). "The Likert scale revisited: an alternate version." Journal of the Market Research Society **39**(2): 331-348.

Alesani, D. (2008). Performance Accountability in United Nations System Organizations: Between Managerial Reforms And The Search For Legitimacy. Economics. Bocconi, Università Commerciale L.Bocconi**:** 220.

Alum, M. (1997). "Budgetary process in uncertain contexts: a study of state-owned enterprises in Bangladesh." Management Accounting Research **8**: pp. 147-167.

Bentler, P. M. and D. G. Bonett (1980). "Significance tests and goodness of fit in the analysis of covariance structures." Psychological Bulletin **88**(3): pp. 588-606.

Blau, P. M. and R. A. Schoenherr (1971). The Structure of Organizations. New York, Basic Books.

Bollen, K. A. (1989). Structural Equations with Latent Variables. New York, John Wiley and Sons.

Bollen, K. A. (2007). Course notes in Structural Equation Models 11th Course of the ECAS (European Courses in Advanced Statistics) Programme. Grenoble France.

Bragg, S. M. (2005). Fast Close. A Guide to Closing the Books Quickly. Hoboken, John Wiley & Sons, Inc.

Brown, C. and I. Vessey (1999). "ERP implementation approaches: toward a contingency framework." Proceeding of the 20th international conference on Information Systems: 411 - 416.

Browne, M. W. and R. Cudeck (1993). Alternative ways of assessing model fit. Testing Structural Equation Models. K. A. Bollen and J. S. Long, Sage.

Bruns, W. J. and J. H. Waterhouse (1975). "Budgetary control and organization structure." Journal of Accounting Research **13**(2): pp. 177-203.

Bryman, A. and E. Bell (2003). Business Research Methods. Oxford, Oxford University Press.

Burns, W. J. and J. H. Waterhouse (1975). "Budgetary control and organization structure." Journal of Accounting Research: 177 - 203.

Burrell, G. and G. Morgan (1979). Social Paradigms and Organisational Analysis. London, Heinemann.

Cadez, S. and C. Guilding (2008). "An exploratory investigation of an integrated contingency model of strategic management accounting." Accounting Organizations and Society 33.

Catanach, A. H. and S. C. Rhoades (2003). "Enron: A Financial Reporting Failure? ." Villanova Law Review 48(4): 1057.

Chapman, C. S. (1997). "Reflections on a contingent view of accounting." Accounting Organizations and Society 22(2): 189-205.

Chenhall, R. H. (2003). "Management control systems design within its organizational context: findings from contingency-based research and directions for the future." Accounting, Organization and Society 28: pp. 127-168.

Chenhall, R. H. and D. Morris (1986). "The Impact of Structure, Environment, and Interdependence on the Perceived Usefulness of Management Accounting Systems." The Accounting Review 61(1): 16-35.

Child, J. (1973). "Strategies of Control and Organizatinal Behaviour." Administrative Science Quarterly March: 1 - 17.

Child, J. (1974a). "Managerial and Organisational Factors Associated with Company Performance, Part I: A Contingency Analysis." Journal of Management Studies 11(3): 175-189.

Child, J. (1974b). "What Determines Organisational Performance? The Universals vs The It-All-Depends." Organisational Dynamics 3(1): pp. 2 - 18.

Child, J. (1996). Predicting and understanding organisational structure. Westmead, England, Saxon House.

Child, J. and R. Mansfield (1972). "Technology, Size, and Organization Structure." Sociology 6(3): pp. 369-393.

Chua, W. C. (1986). "Radical Developments in Accounting Thought." The Accounting Review 61(4): 601 - 632.

Cron, W. and M. Sobol (1983). "The relationship between computerization and performance: a strategy for maximizing economic benefits of computerization." Information & Management 6: 171 - 181.

Dawis, R. V. (1987). "Scale Construction." Journal of Counseling Psychology **34**(4): 481 - 489.

Diener, E. and R. Crandall (1978). Ethics in Social and Behavioral Research. Chicago, University of Chicago Press.

Doherty, N. F. and M. King (1998). "The Importance of Organisational Issues in Systems Development." Information Technology & People **11**(2): pp 104-123.

Donaldson, L. (1996). For Positivist Organisational Theory: Proving the Hard Core, Sage Publications Inc.

Donaldson, L. (2001). The Contingency Theory of Organisations, Sage Publications Inc.

Dowling, J. and J. Pfeffer (1975). "Organizational legitimacy: Societal values and organisational behaviour." Pacific Sociological Review **18**(1): pp. 122-136.

Drazin, R. and A. H. Van de Ven (1985). "Alternative forms of fit in contingency theory." Administrative Science Quarterly **30**: 514 - 539.

Duncan, R. B. (1972). "Characteristics of Organizational Environments and Perceived Environmental Uncertainty." Administrative Science Quarterly **17**(3): 313-327.

Eaton, S. (2005). "Crisis and the Consolidation of International Accounting Standards: Enron, The IASB, and America." Business and Politics **7**(3): pp. 1137-1137.

Fabrigar, L. R., D. T. Wegener, et al. (1999). "Evaluating the Use of Exploratory Factor Analysis in Psychological Research." *Psychological Methods* **4**(3): pp. 272-299.

Fridman, B. and L. Ostman (1989). Accounting development-some perspectives: a book in honour of Sven-Erik Jobansson. Stockholm, Economic Research Institute.

Gerdin, J. (2005). "Management accounting system design in manufacturing departments: an empirical investigation using a multiple contingencies approach." Accounting Organizations and Society **30**: 99-126.

Gerdin, J. and J. Greve (2004). "Forms of contingency fit in management accounting research—a critical review." Accounting Organizations and Society **29**: 303 - 326.

Gerhardy, P. G. (2002). An Extended Contingency Model of Environmental Factors Influencing National Accounting and Disclosure Practices. Adelaide, Flinders University.

Gernon, H. and W. R.S.O. (1995). "International Accounting Research: A Review of Its Ecology, Contending Theories and Methodologies." Journal of Accounting Literature **14**: pp. 54 -106.

Ginzberg, M. J. (1979). "A Study of the Implementation Process." TIMS Studies in the Management Sciences **13**: 85-102.

Gordon, L. A. and D. Miller (1976). "A contingency framework for the design of accounting information systems." Accounting, Organizations and Society **1**(1): 59-69.

Guilding, C. (1999). "Competitor-focused accounting: An exploratory note." Accounting Organizations and Society **24**: 583-595.

Hartmann, F. G. H. and F. Moers (1999). "Testing contingency hypotheses in budgetary research: an evaluation of the use of moderated regression analysis." Accounting, Organization and Society **24**(4): 291-315.

Hartmann, F. G. H. and F. Moers (2003). "Testing contingency hypotheses in budgetary research using moderated regression analysis: a second look." Accounting Organizations and Society **28**: 803–809.

Hayes, D. C. (1977). "The Contingency Theory of Managerial Accounting." Accounting Review **52**(1): 22-39.

Herche, J. and B. Engelland (1996). "Reversed-Polarity Items and Scale Unidimensionality." Journal of the Academy of Marketing Science **24**(Fall): 366 – 74.

Hofstedt, T. R. and J. C. Kinard (1970). "A Strategy for Behavioural Accounting Research." The Accounting Review(January): 38-54.

Hoque, Z. and W. James (2000). "Linking balanced scorecard measures to size and market factors: Impact on organizational performance." Journal of Management Accounting Research **12**: 1-17.

Hu, L. T. and P. M. Bentler (1999). "Cut-off Criteria for Fit Indices in Covariance Structure Analysis: Conventional Criteria versus New Alternatives." Structure Equation Modeling **6**(1): pp. 1-55.

Huczynski, A. A. and D. A. Buchanan (2006). Organizational Behaviour, FT Prentice Hall.

Ifinedo, P. (2007). "Interactions between organizational size, culture, and structure and some IT factors in the context of ERP success assessment: an exploratory investigation." Journal of Computer Information Systems **Summer**: 28 - 45.

International Accounting Standards Committee Foundation (2005). International Financial Reporting Standard 3.

Ittner, C. D. and D. F. Larcker (2001). "Assessing empirical research in management accounting: a value-based management perspective." Journal of Accounting & Economics **32**(1 - 3): pp. 349 - 410.

Ives, B., M. Olson, et al. (1983). "Measuring user information satisfaction: a method and critique." Communications of the ACM **26**(10): 785 - 793.

Johnson, H. T. and R. S. Kaplan (1987). Relevance Lost. The Rise and Fall of Management Accounting. Boston, Massachusetts, Harvard Business School Press.

Jones, C. S. (1986). "Organisational Change and the Functioning of Accounting." Journal of Business Finance & Accounting **13**(3): pp. 283 - 310.

Kaplan, R. S. (1984). "The Evolution of Management Accounting." The Accounting Review: pp. 390 - 418.

Khandwalla, P. (1972). "The effects of different types of competition on the use of management controls." Journal of Accounting Research **Autumn**: pp. 275-285.

Klein, H. K. and M. D. Myers (1999). "A set of principles for conducting and evaluating interpretive field studies in information systems." MIS Quarterly **23**(1): 67 - 94.

KPMG (2006). Quality Close: The Race to Close Survey. Johannesburg, South Africa.

Lawrence, P. and J. Lorsch (1967). Organization and environment. Homewood, Irwin.

Libby, T. and J. H. Waterhouse (1996). "Predicting change in management accounting systems." Journal of Management Accounting Research **8**: 137-150.

Longenecker, J. G. and C. D. Pringle (1978). "The Illusion of Contingency Theory as a General Theory." Academy of Management Review **3**(3): pp. 679 - 682.

Lucas, H. C. (1975). "The use of an accounting information system, action and organizational performance." The Accounting Review **50**(4): 735 - 746.

Lucas, H. C., M. J. Ginzberg, et al. (1990). Information Systems Implementation. Testing a Structural Model. Norwood, New Jersey, Ablex Publishing Corporation.

Luthans, F. and T. I. Stewart (1977). "A General Contingency Theory of Management." Academy of Management Review **2**: pp. 181 - 195.

Markus, M. L. (1983). "Power, politics and MIS implementation." Communications of the ACM **26**(6): 430 - 444.

Markus, M. L. and D. Robey (1988). "Information technology and organizational change: causal structure in theory and research." Management Science **34**(5).

Martin, E. W. (1982). "Critical success factors of chief MIS/DP executives." MIS Quarterly **6**(2): 1 - 9.

McCall, R. B. (1986). Fundamental Statistics for Behavioural Sciences. San Diego, Harcourt Brace Jovanovich.

Merchant, K. A. (1981). "The Design of the Corporate Budgeting System: Influences on Managerial Behaviour and Performance." Accounting Review **56**(4): 813-829.

Miller, D. (1975). "Strategy Making in Context: Some Emperical Archetypes." McGill University Working Paper.

Myers, M. D. and M. Newman (2006). "The qualitative interview in IS research: Examining the craft." Information and Organization **17**: pp. 2-26.

Naranjo-Gil, D. and F. Hartmann (2007). "Management accounting systems, top management team heterogeneity and strategic change." Accounting Organizations and Society **32**: 735-756.

Newing, R. (1996). "Ledgers are often not the best tool for financial consolidation." Management Accounting **74**(2): 58.

Nicolaou, A. I. (2000). "A contingency model of perceived effectiveness in accounting information systems: Organizational coordination and control effects." International Journal of Accounting Information Systems **1**: pp. 91-105.

Nicolaou, A. I. (2000). "A contingency model of perceived effectiveness in accounting information systems: Organizational coordination and control effects." International Journal of Accounting Information Systems **1**(2): pp. 91-105.

Oldert, N., Ed. (2008). Profile's Stock Exchange Handbook. Johannesburg, Profile Media.

Otley, D. T. (1980). "The contingency theory of Management Accounting: Achievement and Prognosis." Accounting, Organizations and Society **5**(4): 413-428.

Otley, D. T. (1985). Developments in Management Accounting Research. The British Accounting Association Conference.

Ouksel, A. M., K. Mihavics, et al. (1997). "Accounting information systems and organization learning: A simulation." <u>Accounting, Management and Information Technologies</u> **7**(1): 1 - 19.

Pugh, D. S. and D. J. Hickson, Eds. (1976). <u>Organisational Behaviour in its Context (The Aston Programme 1)</u>. London, Saxon House.

Pugh, D. S., D. J. Hickson, et al. (1969). "The Context of Organization Structures." <u>Administrative Science Quarterly</u> **March**: 91-114.

Pugh, D. S. and C. R. Hinings, Eds. (1976). <u>Organisational Behaviour in its Context (The Aston Programme 2)</u>. London, Saxon House.

Pugh, D. S. and R. L. Payne, Eds. (1977). <u>Organisational Behaviour in its Context (The Aston Programme 3)</u>. London, Saxon House.

Raykov, T. and G. A. Marcoulides (2000). <u>A First Course in Structural Equation Modeling</u>. Mahwah, New Jersey, Lawrence Erlbaum Associates Publishers.

Raykov, T. and G. A. Marcoulides (2006). <u>A First Course in Structural Equation Modeling</u>. Mahwah, Lawrence Erlbaum Associates.

Rayner, N. (2007). Understand When to Use Your General Ledger for Financial Consolidation, Gartner.

Reid, G. C. and J. A. Smith (2000). "The impact of contingencies on management accounting system development." <u>Management Accounting Research</u> **11**(pp. 427-450).

Russell, C. and P. Bobko (1992). "Moderated Regression Analysis and Likert Scales: Too Coarse for Comfort." <u>Journal of Applied Psychology</u> **77**(3): 336 - 342.

Sasso, W. C. (1988). "Architectures for Financial Consolidation: A Comparative Study." <u>The Journal of Accounting and EDP</u> **3**(4): 4 - 11.

Saunders, C. and R. Scamell (1986). "Organizational power and the information services department: a re-examination." <u>Communications of the ACM</u> **29**(2): 142 - 147.

Seddon, P., M. Wong, et al. (1992). "Computer-Based General Ledger Systems: An Exploratory Study." <u>Journal of Information Systems</u> **Spring**: 93 - 110.

Sekaran, U. (2003). <u>Research Methods for Business</u>. Hoboken, John Wiley & Son, Inc.

Sharma, D. S. (2002). "The differential effect of environmental dimensionality, size, and structure on budget system characteristics in hotels." <u>Management Accounting Research</u> **13**: pp. 101- 130.

Shields, M. D., F. J. Deng, et al. (2000). "The design and effects of control systems: tests of direct and indirect-effects models." Accounting, Organizations and Society **25**(2): pp. 185- 202.

Social Research Association (2003). Ethical Guidelines.

Starkey, K. and P. Madan (2001). "Bridging the Relevance Gap: Aligning Stakeholders in the Future of Management Research." British Journal of Management **12**(Special Issue): S3 - S26.

Steenkamp, J. E. M. and H. B. Baumgartner (1998). "Assessing Measurement Invariance in Cross-National Consumer Research." Journal of Consumer Research **25**(June): pp. 78-90.

Swain, S. D., D. Weathers, et al. (2008). "Assessing Three Sources of Misresponse to Reversed Likert Items." Journal of Marketing Research **45**(February): 116 - 131.

Szilagyi, A. and M. Wallace (1980). Organizational Behaviour and Performance. Santa Monica, CA, Goodyear.

Thomas, A. P. (1986). "The Contingency Theory of Corporate Reporting: Some Empirical Evidence." Accounting Organizations and Society **11**(3): 253-270.

Thomas, A. P. (1991). "Towards a Contingency Theory of Corporate Financial Reporting Systems." Accounting, Auditing & Accountability Journal **4**(4): 40-57.

Tiessen, P. and J. H. Waterhouse (1978). "The contingency Theory of Management Accounting: A Comment." Accounting Review(April): 523 - 529.

Van Decker, J. E. (2007). Criteria for Selecting Financial Consolidation Solutions, Gartner.

Venkatraman, N. (1989). "The Concept of Fit in Strategy Research: Toward Verbal and Statistical Correspondence." Academy of Management Review **14**(3): 423 - 444.

Ventana Research (2005). Financial Reporting and Consolidation: Taking Performance to the Next Level. San Mateo.

Waterhouse, J. H. and P. Tiessen (1978). "A Contingency Framework for Management Accounting Research." Accounting Organizations and Society **3**(1): 65-76.

Watson, D. (1992). "Correcting for Acquiescent Response Bias in the Absence of a Balanced Scale: An Application to Class-Consciousness." Sociological Methods and Research **21**(August): 52 - 88.

Weill, P. and M. Olson (1989). "An Assessment of the Contingency Theory of Management Information Systems." <u>Journal of Management Information Systems</u> **6**(1): 59 - 85.

Williams, S. M. (1999). "Voluntary Environmental and Social Accounting Disclosure Practices in the Asia-Pacific Region: An International Empirical Test of Political Economy Theory." <u>The International Journal of Accounting</u> **34**(2): pp. 209-238.

Woods, M. (2009). "A contingency theory perspective on the risk management control system within Birmingham City Council." <u>Management Accounting Research</u> **20**: pp. 69 - 81.

Appendices

Appendix A – Self Completion Questionnaire

1. <u>English Version of the Introductory E-mail Sent to Potential Participants</u>

Dear *<Name of Participant>*

I refer to our telephone conversation today, during which I explained that I am conducting research for a doctorate degree. The attached letter from Durham University confirms that I am a doctoral research student. I would appreciate it if you could complete the attached questionnaire on behalf of *<Name of listed company>* and return it to me by means of e-mail. Other participants have experienced that it takes approximately 10 minutes to complete.

The questionnaire is designed to investigate certain aspects of consolidation systems used by companies listed on the JSE. In particular, this research will explore the impact of the design and usage of consolidation systems on the ability of listed companies to rapidly complete the consolidation at year-end.   Participation with this research is voluntary, but upon completion of the research, each participant will be provided with a summary of the research results. This summary will include, amongst others, some benchmarking data relating to:

1. The number of days required to complete your consolidation at group level.
2. The sophistication of your consolidation system.
3. The formalisation of your consolidation system.

This benchmarking information will indicate how your company compares to the average of all the research participants.   All research participants will remain

anonymous and the information revealed in the questionnaire will be treated confidentially.

I also attach a letter from the South African Institute of Chartered Accountants, by whom my research is endorsed.

Please do not hesitate to contact me if you have any questions regarding the research.

Yours sincerely

Pieter Smith
079 525 3718

2. <u>Afrikaans Version of the Introductory E-mail Sent to Potential Participants</u>

Beste *<Name of Participant>*

Ek verwys na ons telefoon gesprek vroeër vandag, toe ek verduidelik het dat ek besig is om navorsing te doen vir 'n doktorsgraad. Aangehegte brief van Durham University in Engeland bevestig my registrasie as navorsingsstudent. Ek sal dit baie wardeer as jy die aangehegte vraelys sal voltooi namens *<Name of listed company>* en dit vir my terug sal stuur deur middel van e-pos. Die vraelys behoort jou slegs 10 minute te neem om te voltooi.

Die vraelys beoog om bepaalde aspekte van die konsolidasiestelsels wat gelyste maatskappye gebruik, te ondersoek. Die doelstelling van die navorsingprojek is om die impak van konsolidasiestelsels op die vermoeë van gelyste maatskappye om groepkonsolidasie gedurende die jaareinde spoedig te voltooi, te ondersoek.

Maatskappye wat bydra tot die navorsingsinligting sal 'n opsomming van die navorsingsresultate ontvang. Die navorsingsresultate sal ondermeer die volgende "benchmarking"-inligting insluit:

- Die aantal dae wat die betrokke maatskappy benodig om sy groepkonsolidasie af te handel.
- Die vlak van gesofistikeerdheid van die konsolidasiestelsel van die betrokke maatskappy.
- Die vlak van geformaliseerdheid van die konsolidasiestelsel van die betrokke maatskappy.

'n Aanduiding hoe die konsolidasiestelsel van die betrokke maatskappy vergelyk met die konsolidasiestelsel van soortgelyke maatskappy. Maatskappye wat deelneem sal anoniem bly en die navorsingsinligting wat van sodanige maatskappye ontvang word sal vertroulik bly.

Ingesluit is ook 'n brief van die South African Institute of Chartered Accountants wat hierdie navorsingprojek onderskryf.

Moet asseblief nie huiwer om my te kontak as jy enige verdere inligting oor my navorsing wil bekom nie.

Met vriendelike groete

Pieter Smith
079 525 3718

3. Notes to the person completing the questionnaire

Instructions

1	An explanatory note or example has been attached to some questions. Cells with a note attached is marked with a red triangle in the top right corner. To reveal the note, place your mouse pointer over the relevant cell.

Question wording

|	
2	**Approximations** are entirely acceptable if the exact figure is not know.
3	The term **"consolidation application"** mentioned in the questionnaire, refers to the computer application or system that was **mainly** used during the most recent year-end process to facilitate the consolidation of the group financial data. Some companies use spreadsheets, the general ledger or ERP system to perform the consolidation; while some companies make use specialised applications.
4	All information will be treated **confidentially.**
5	Participants will remain **anonymous.**
6	Note that there is **no one correct answer** to any of the questions - so please answer all questions truthfully.
7	Choose the one answer to each question that best represents your view by clicking on the **most appropriate** option.
8	Please complete the questionnaire on the next worksheet and return the saved file by means of e-mail to the researcher - Pieter Smith.

4. Questionnaire

Questionnaire

Progress

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
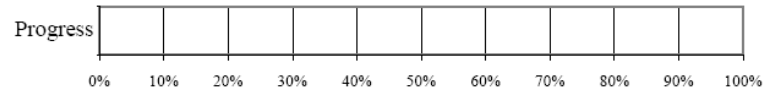
1   What software application was **mainly** used to perform the consolidation of the listed group at the most recent financial year-end?

2   What is the **total number** of companies (including holding companies, subsidiaries, joint ventures and associates) that are contained in the listed group?

3   How many partially owned subsidiaries are contained in the listed group?
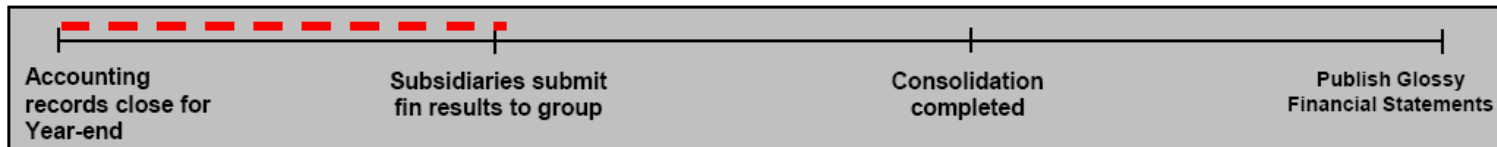
4   How many joint ventures are contained in the listed group?

5   How many associate companies are contained in the listed group?

210

[   ]

6 In how many countries does the group have operations?

[   ]

7 In how many separate divisions or lines of business is the listed group organised? These divisions or lines of business should be different **types** of business.

[   ]

8 How many **working days** elapsed between the date financial records were closed for the year-end, and the date when financial information was submitted by subsidiaries, joint ventures and associates, to the **group** for consolidation?
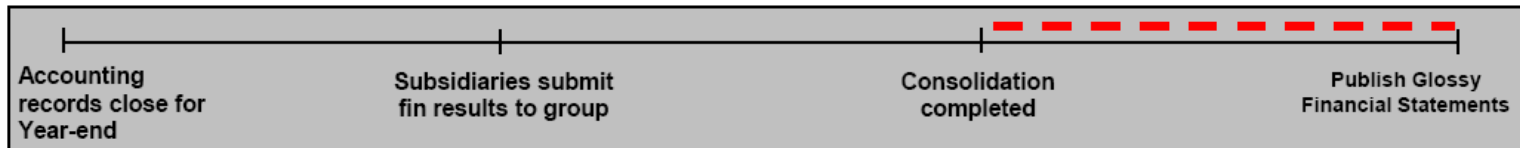
| Accounting records close for Year-end | Subsidiaries submit fin results to group | Consolidation completed | Publish Glossy Financial Statements |

[   ]

9 How many **working days** did it take to complete the consolidation only at **group** level?

| Accounting records close for Year-end | Subsidiaries submit fin results to group | Consolidation completed | Publish Glossy Financial Statements |

According to your impression, on average, how many hours was worked per day by a **group**
10 **consolidation accountant** during the period when the **consolidation at group level** was performed at the most recent year-end?

⊙ Less than 4   ⊙ More than 4 but less than 8   ⊙ More than 8 but less than 12   ⊙ More than 12 but less than 16   ⊙ More than 16

How many **working days** did it take after the consolidation at group level was completed, to
11 publish the full set of "glossy" consolidated financial statements for **external** users?

| Accounting records close for Year-end | Subsidiaries submit fin results to group | Consolidation completed | Publish Glossy Financial Statements |

212

12 Specify **any** issue that caused a significant delay in completing the consolidation during the most recent year-end. Type "None" if no material delay was experienced.

13 How many accountants are *directly* involved with the **consolidation** of financial data at group level?

- **Please indicate the extent to which you agree or disagree with the following statements.**
- **Select the "Neutral / don't know" option if you do not know whether to agree or disagree with the statement.**

14 In my opinion, the listed group includes companies that operate a wide range of different **types** of business.

  ⊙ Disagree Strongly   ⊙ Disagree   ⊙ Neutral / don't know   ⊙ Agree   ⊙ Agree Strongly

15 Most companies in the group have their own **general ledger** that operates on a separate application.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

16 Most companies in the group have their own distinct **chart of accounts**.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

17 The actual consolidation at group level is **mainly** performed on spreadsheets.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

18 Accountants have to extract data from the general ledger and manually capture data into spreadsheets from where it is transferred into the consolidation application.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

19 Transferring data from the consolidation application into financial reports requires manual effort by accountants

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

20 The consolidation application facilitates workflow, where the financial results of each company in the group, can progress through a number of stages, before it is made available for consolidation.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

21   Each user would obtain access to the consolidation application with a username and password that is unique to that individual.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

22   An audit trail is available for **all** consolidation adjustments that are made.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

23   All users with access to the consolidation application can perform all **functions.**

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

24   Any users with access to the consolidation application can **view** all the data.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

25   The majority of consolidations are performed at a level lower than the group (such as divisional level), only after which this data is submitted to group for further consolidation.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

26 Consolidation adjustments have to be authorised **in the consolidation application** before they can be posted.

   ⊙ Disagree Strongly   ⊙ Disagree   ⊙ Neutral / don't know   ⊙ Agree   ⊙ Agree Strongly

27 **Users** can make permanent design changes to the consolidation application **without** the need to obtain pre-authorisation.

   ⊙ Disagree Strongly   ⊙ Disagree   ⊙ Neutral / don't know   ⊙ Agree   ⊙ Agree Strongly

28 New users of the consolidation application are granted access only after specific documented approval has been granted.

   ⊙ Disagree Strongly   ⊙ Disagree   ⊙ Neutral / don't know   ⊙ Agree   ⊙ Agree Strongly

29 The training provided to new users of the consolidation application is mainly informal on-the-job training.

   ⊙ Disagree Strongly   ⊙ Disagree   ⊙ Neutral / don't know   ⊙ Agree   ⊙ Agree Strongly

30 The accounting entries necessary to eliminate inter-company **transactions** (revenue or expenses) are automatically generated by means of the consolidation application.

   ⊙ Disagree Strongly   ⊙ Disagree   ⊙ Neutral / don't know   ⊙ Agree   ⊙ Agree Strongly

31 The accounting entries necessary to eliminate inter-company **balances** are automatically generated by means of the consolidation application.

    ◉ Disagree Strongly   ◉ Disagree   ◉ Neutral / don't know   ◉ Agree   ◉ Agree Strongly

32 The consolidation application includes budgeting and forecasting data.

    ◉ Disagree Strongly   ◉ Disagree   ◉ Neutral / don't know   ◉ Agree   ◉ Agree Strongly

33 The consolidation application includes non-financial data.

    ◉ Disagree Strongly   ◉ Disagree   ◉ Neutral / don't know   ◉ Agree   ◉ Agree Strongly

34 The consolidation application automatically generates the necessary accounting entries to consolidate investments in subsidiaries, joint ventures and associate companies.

    ◉ Disagree Strongly   ◉ Disagree   ◉ Neutral / don't know   ◉ Agree   ◉ Agree Strongly

35 The consolidation application automatically calculates all the values that are contained in the consolidated Cash Flow statement.

    ◉ Disagree Strongly   ◉ Disagree   ◉ Neutral / don't know   ◉ Agree   ◉ Agree Strongly

36   The majority of the consolidation is performed by accountants at group.

      ⦿ Disagree Strongly   ⦿ Disagree   ⦿ Neutral / don't know   ⦿ Agree   ⦿ Agree Strongly

37   A person with access to the company IT network will automatically have access to the consolidation application.

      ⦿ Disagree Strongly   ⦿ Disagree   ⦿ Neutral / don't know   ⦿ Agree   ⦿ Agree Strongly

38   The **application administrator** can make permanent design changes to the consolidation application **without** the need to obtain pre-authorisation.

      ⦿ Disagree Strongly   ⦿ Disagree   ⦿ Neutral / don't know   ⦿ Agree   ⦿ Agree Strongly

39   Does any company in the listed group prepare its financial statements in a foreign currency?

      ⦿ Yes   ⦿ No

40   The consolidation application automates all foreign exchange calculations.

      ⦿ Disagree Strongly   ⦿ Disagree   ⦿ Neutral / don't know   ⦿ Agree   ⦿ Agree Strongly

41   The consolidation application automatically performs validation calculations on stored values.

| ⦿ Disagree Strongly | ⦿ Disagree | ⦿ Neutral / don't know | ⦿ Agree | ⦿ Agree Strongly |

42   The level of materiality (tolerances) for each account can be varied, in order to determine whether a validation difference is acceptable.

| ⦿ Disagree Strongly | ⦿ Disagree | ⦿ Neutral / don't know | ⦿ Agree | ⦿ Agree Strongly |

43   The consolidation application is used to perform the **entire** tax calculation.

| ⦿ Disagree Strongly | ⦿ Disagree | ⦿ Neutral / don't know | ⦿ Agree | ⦿ Agree Strongly |

44   A distinct specialised application is used to perform the consolidation.

| ⦿ Disagree Strongly | ⦿ Disagree | ⦿ Neutral / don't know | ⦿ Agree | ⦿ Agree Strongly |

45   Accountants are directly involved in transferring general ledger data into the consolidation application

| ⦿ Disagree Strongly | ⦿ Disagree | ⦿ Neutral / don't know | ⦿ Agree | ⦿ Agree Strongly |

46   Some automated validation checks of the data take place, **prior** to its acceptance into the consolidation application. Validation checks could include, amongst others, the listing of any unmapped GL/ERP accounts.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

47   Once the initial setup has been completed, the **internal** management financial reports are automatically populated with the consolidated data

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

48   Once the initial setup has been completed, the **external** financial reports (publicised financial statements) are automatically populated with the consolidated data

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

49   Any permanent design changes to the consolidation application are subject to a formal change control process that requires proper authorisation.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

50   New users are allowed access **only after** they have attended a training course of the consolidation application.

○ Disagree Strongly   ○ Disagree   ○ Neutral / don't know   ○ Agree   ○ Agree Strongly

51   The administrator of the consolidation application is normally informed when a user of the consolidation application is no longer employed by the organisation.

◉ Disagree Strongly   ◉ Disagree   ◉ Neutral / don't know   ◉ Agree   ◉ Agree Strongly

52   The consolidation is **mainly** performed in the general ledger application.

◉ Disagree Strongly   ◉ Disagree   ◉ Neutral / don't know   ◉ Agree   ◉ Agree Strongly

53   How often do subsidiaries submit financial data to the group?

◉ Once a year   ◉ Twice yearly   ◉ Quarterly   ◉ Monthly   ◉ More frequently than monthly

54   I am satisfied with the consolidation application that was used by the group at the most recent year-end.

◉ Disagree Strongly   ◉ Disagree   ◉ Neutral / don't know   ◉ Agree   ◉ Agree Strongly

Appendix B: Semi-Structured Interview Information

1. <u>Semi-Structured Interview Guide</u>

Emphasise that a) Participation is voluntary

b) Information will be treated confidentially

c) Participants will remain anonymous

1	Discuss the Year-End Process (number of days during each phase)
2	Why did the company decide on this particular consolidation system? (advantages / disadvantages)
3	Discuss the problems encountered
4	Discuss decentralisation of the group
5	Discuss the sophistication of the system
6	Discuss the formalisation of the consolidation process
7	Discuss the integration of the system
8	Discuss the level of satisfaction with the system

2. Interviewee Preliminary Research Results Report

The report listed below was presented to each of the semi-structured interview participants. In order to guarantee anonymity, the name of the participant to which this report relates has been removed and replaced with "Co X".

Financial Consolidation Systems
Research Findings

October 2008
Co X

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Introduction

•Research Purpose: Investigate the design and use of financial

consolidation systems

•Sampling Frame: JSE Listed Companies

•Method: Self Completion Questionnaire

•Participants: Group Accountants / System Administrators

•210 Companies

•57% Response Rate

•Data Collection Period: June – September 2008

Principal Consolidation Application: Grouping

Spreadsheet or Customised Data Base

- •Essbase
- •Lotus 123
- •MS Excel
- •MS Access

Accounting Application or ERP

- •Accpac
- •Great Plains
- •MPC
- •Oracle
- •Pastel
- •SAP

Co X

Specialised Consolidation Application

- •Caseware
- •Cognos
- •FDC
- •HFM
- •Hyperion Enterprise
- •Outlooksoft

Principal Consolidation Application

Specialised Consolidation Application 20%

Accounting Application or ERP 18%

Spreadsheet or Customised Database 62%
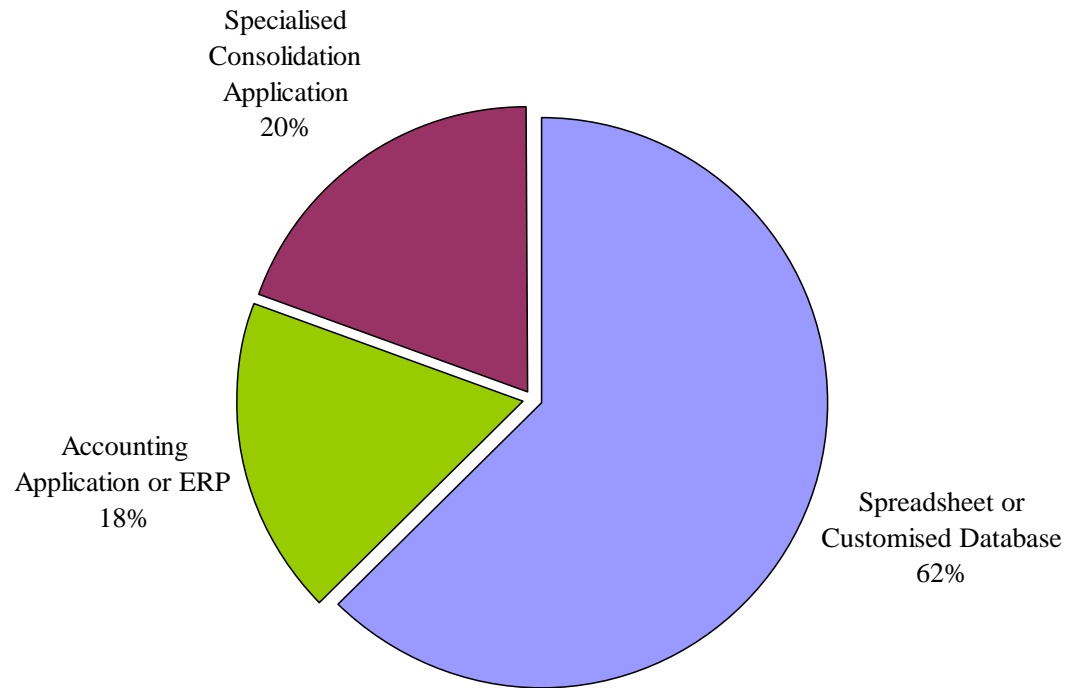
Turnover

10 – 90th Percentile
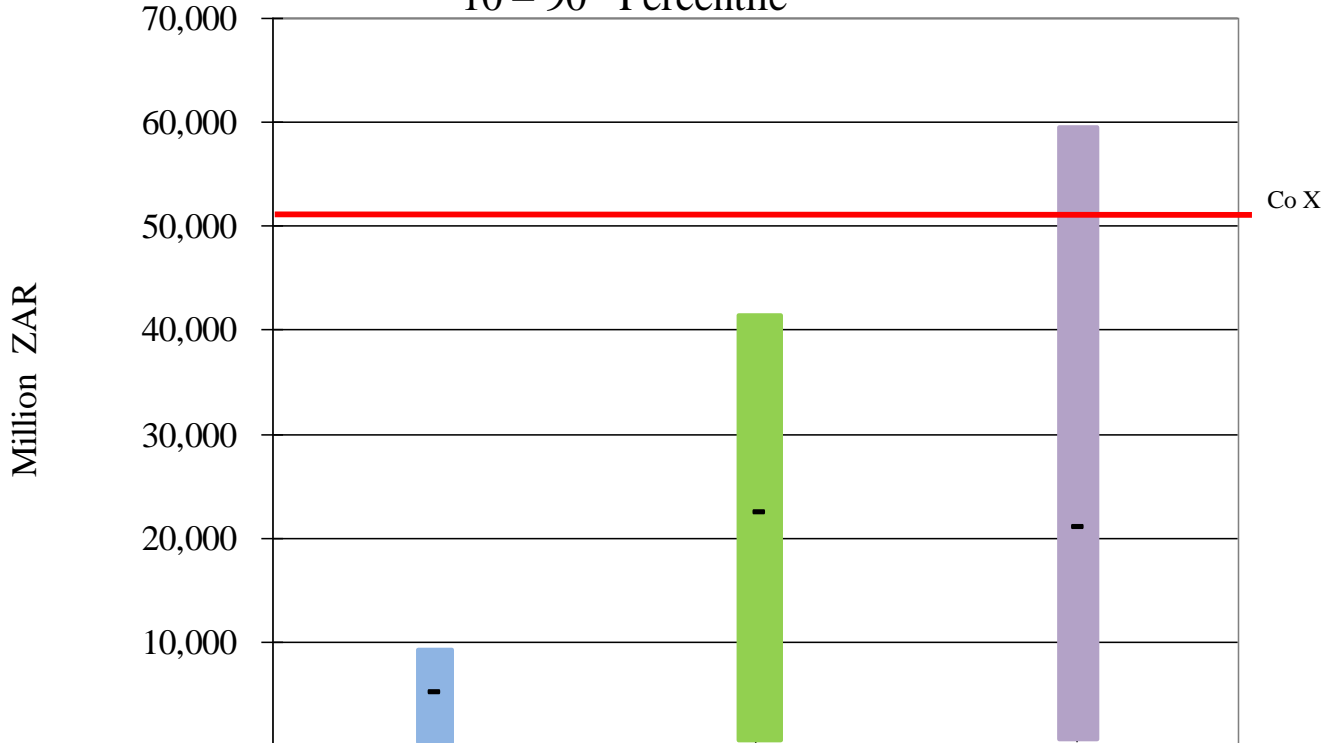
	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
10th percentile	88	192	250
90th percentile	9,086	40,380	59,281
- Mean	5,100	22,332	21,139

Co X

Million ZAR

227

Decentralisation

10 − 90th Percentile
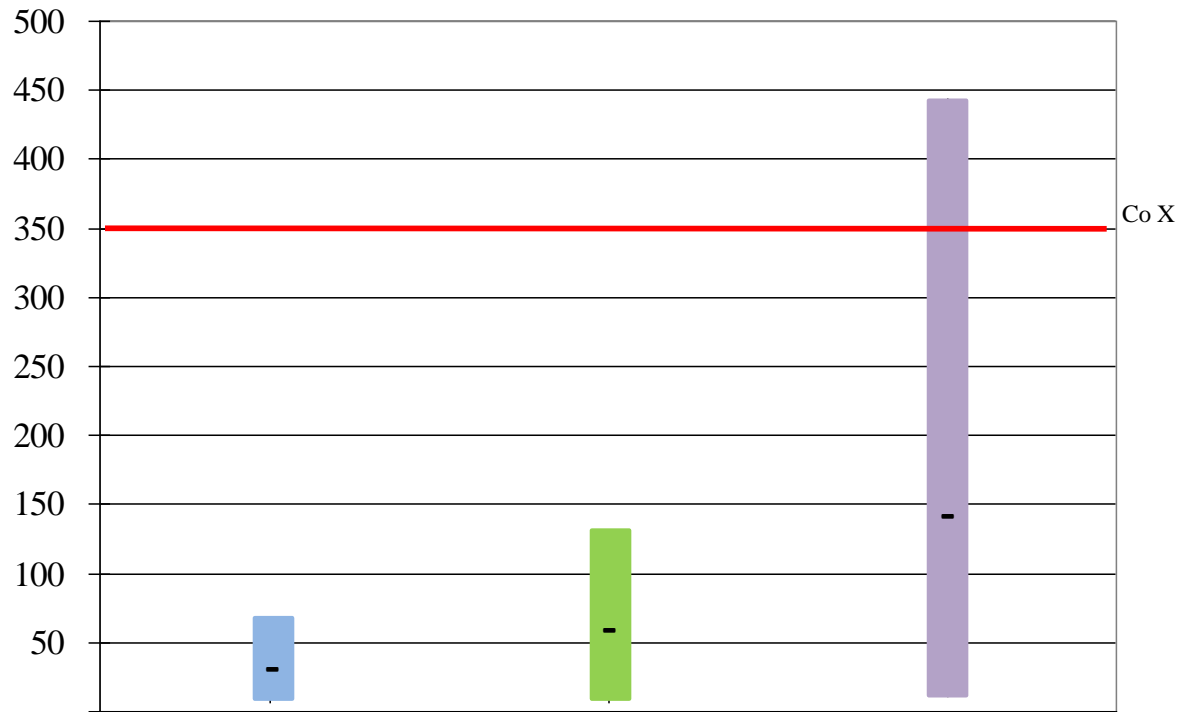
	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
10th percentile	5	5	10
90th percentile	69	132	444
▬ Mean	32.3	58.1	142.8

228

Complex Consolidation Entities

10 – 90th Percentile
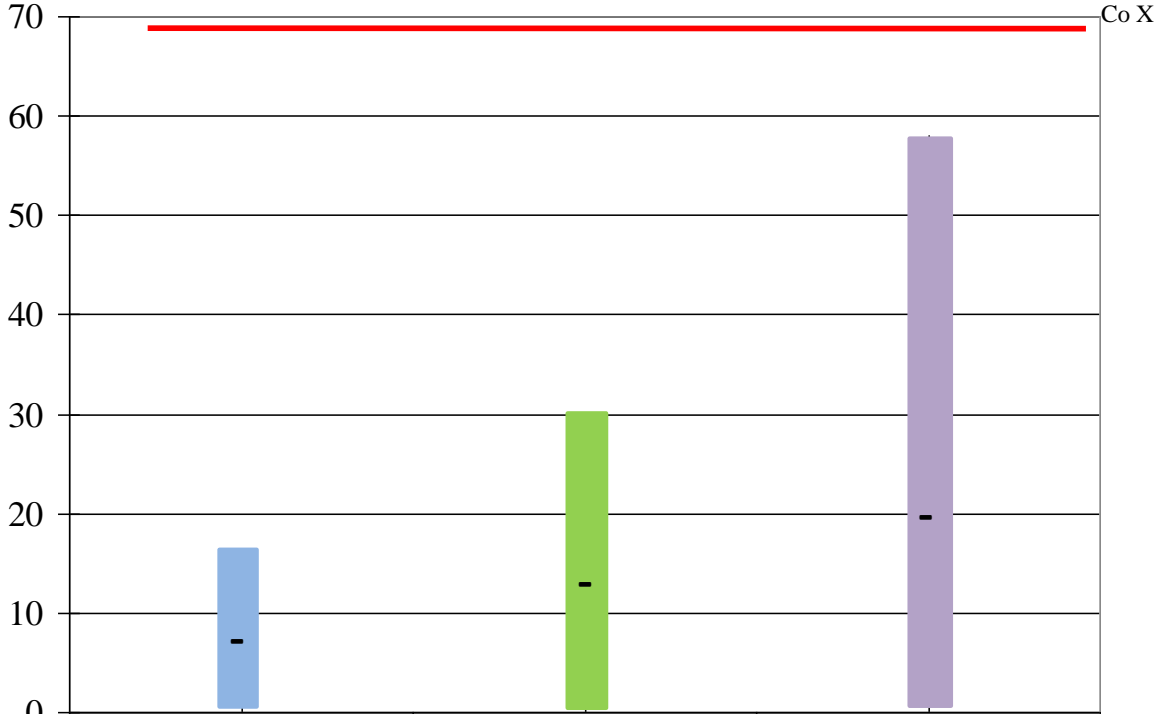
	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
10th percentile	-	-	-
90th percentile	16	30	58
Mean	7.1	12.8	19.8

Countries

10 – 90th Percentile
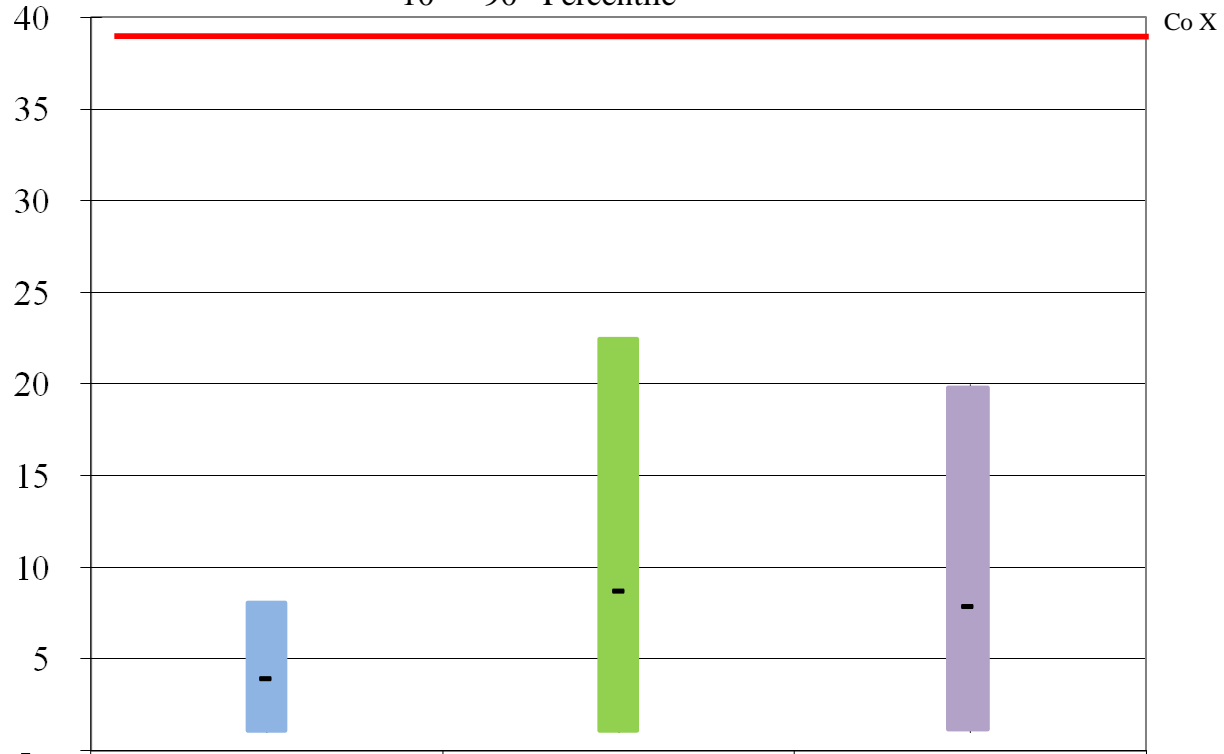
	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
10th percentile	1	1	1
90th percentile	8	23	20
Mean	3.9	8.7	7.9

Co X

Sophistication: Elements

- Elimination of Inter-Group Transactions
- Consolidation Adjusting Entries
- Cash Flow
- Forex Translations
- Validations
- Budgeting & Forecasting
- Non-Financial Data
- Tax Calculations

Sophistication
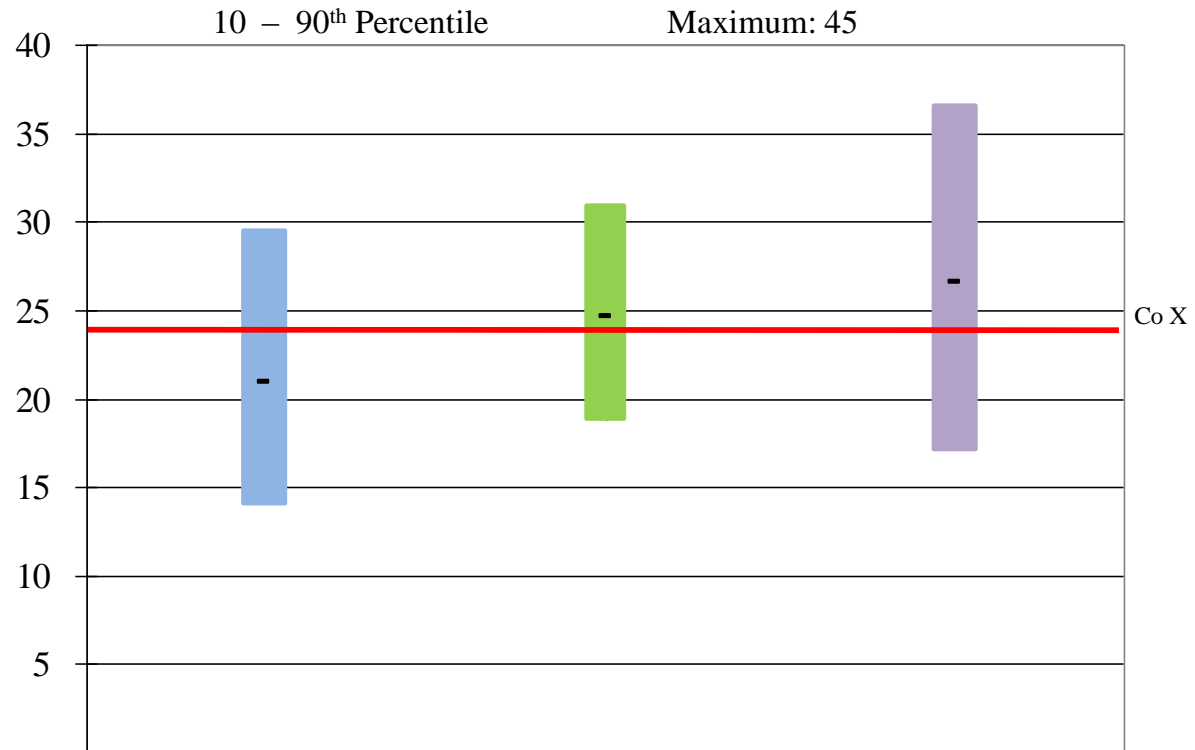
10 – 90th Percentile   Maximum: 45

Co X

	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
10th percentile	14	19	17
90th percentile	29	31	36
▬ Mean	21.1	24.9	26.9

Integration: Elements

- Manual Capturing of Data
- Management Reports
- Annual Financial Statements

Integration
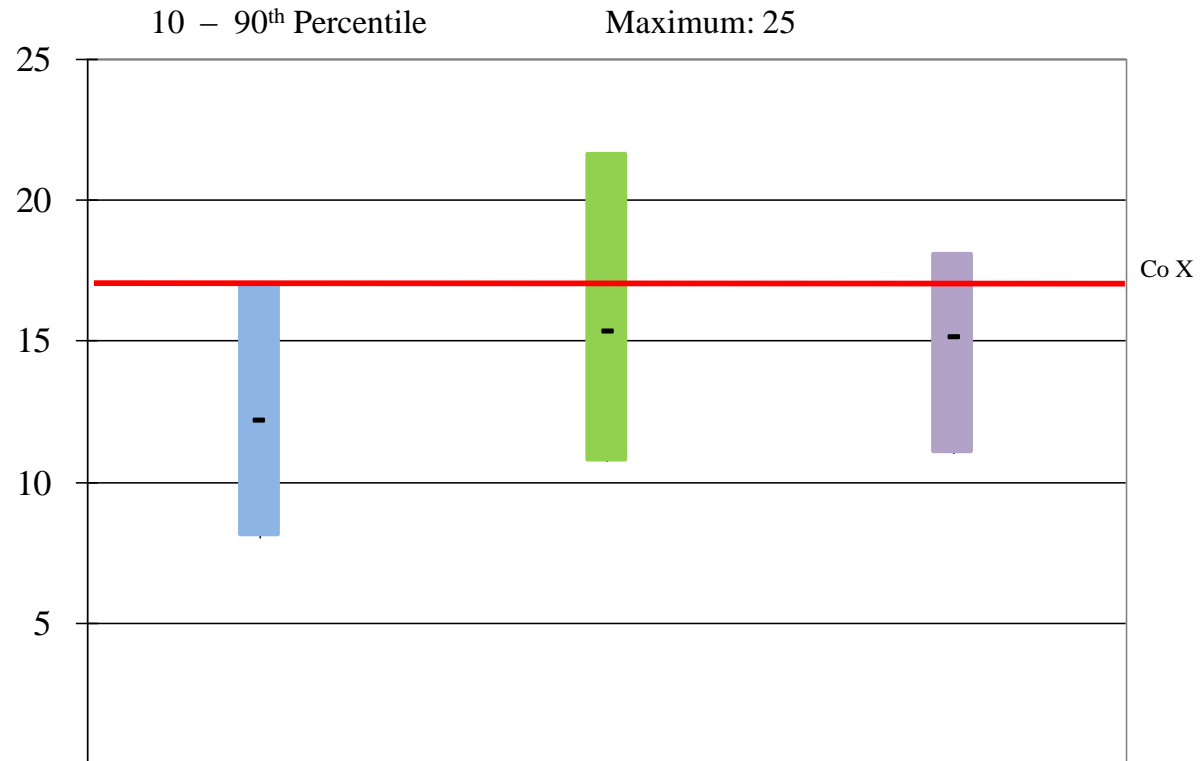
10 – 90th Percentile   Maximum: 25

Co X

	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
10th percentile	8	11	11
90th percentile	17	21	18
▬ Mean	12.3	15.4	15.2

Formalisation: Elements

- Access
- Viewing Rights
- User Functions
- Changes to the Application
- User Training

Formalisation
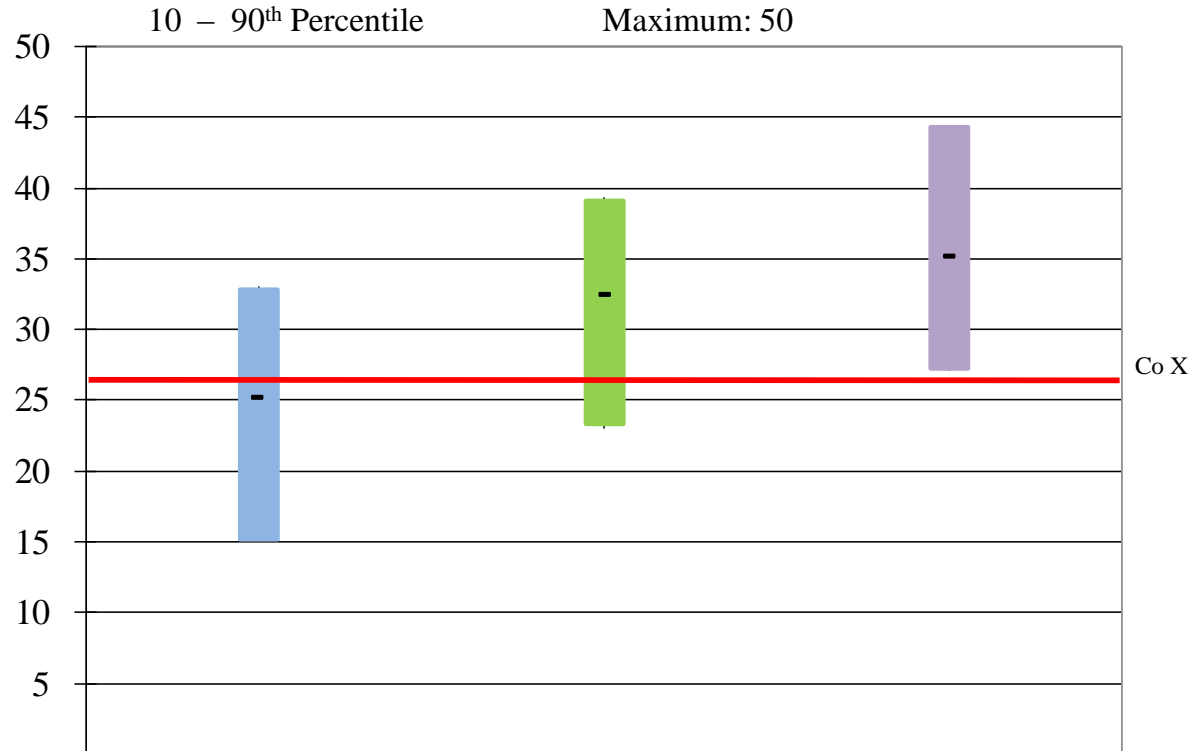
10 – 90th Percentile   Maximum: 50

Co X

	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
10th percentile	15	23	27
90th percentile	33	39	44
− Mean	25.1	32.3	35.2
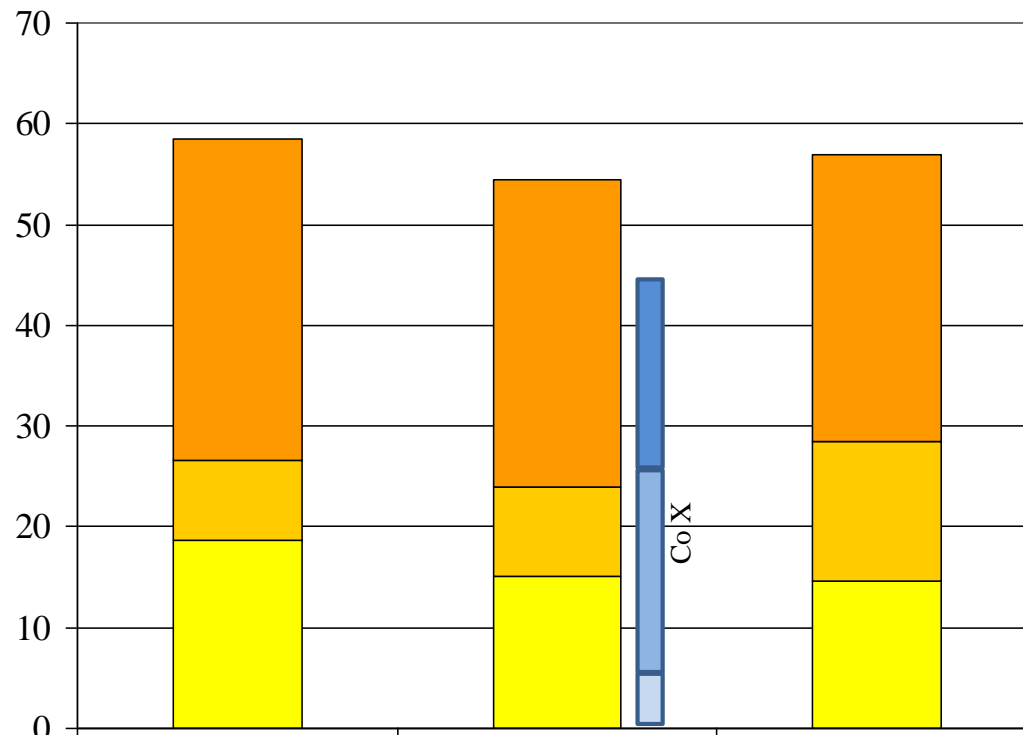
236

Number of Days to Complete: Phases

237

Number of Days to Complete

	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
Phase 3	31.9	30.6	28.4
Phase 2 - Normalised	7.9	8.7	14.0
Phase 1	18.7	15.1	14.6

Satisfaction
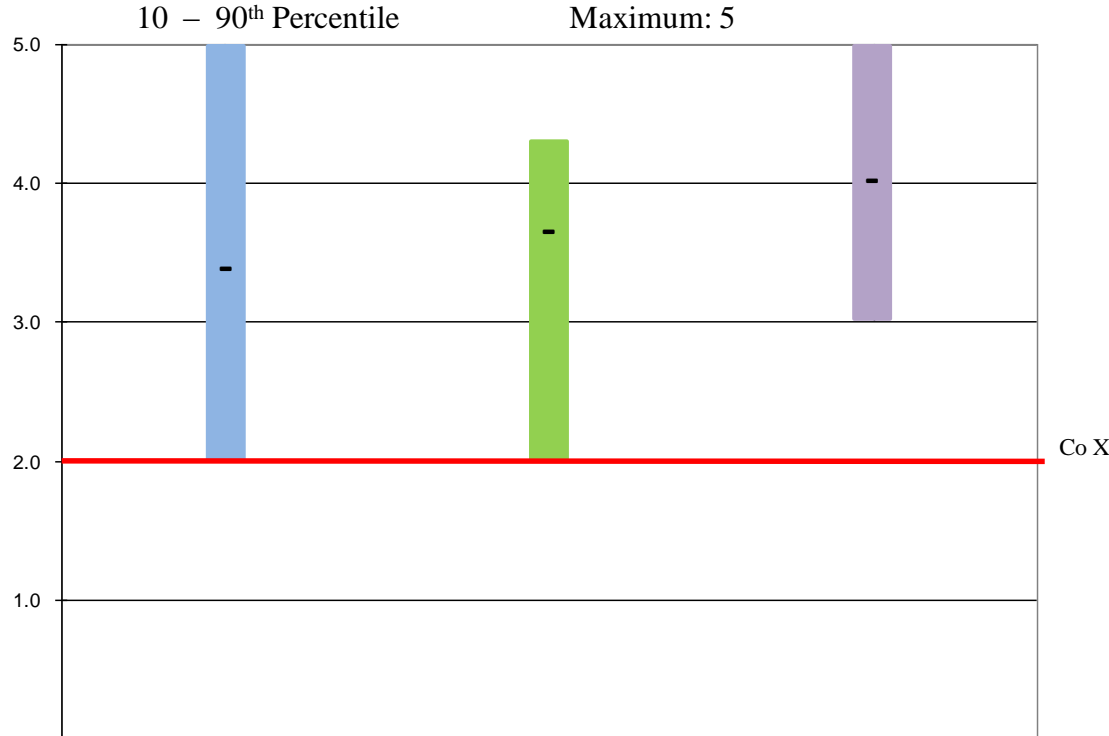
Co X

	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
10th percentile	2.0	2.0	3.0
90th percentile	5.0	4.3	5.0
▬ Mean	3.4	3.7	4.0

239

Appendix C: Semi-Structured Interview Analysis Table

This appendix contains the table that was the product of the analysis of the semi-structured interviews. The names of all participants were removed from this table in order to guarantee the anonymity of interviewees. The table has been organised according to the themes that were identified during the reading of the transcribed interviews. The table has been grouped according to the following themes:

8. Application Type
9. Consolidation Period
10. Formalisation
11. Integration
12. Other Systems
13. People
14. Sophistication

1. <u>Application type</u>

Interviewee	**Interview Quote**	**Page**	**Interpretive Comment**
Co 1	Yes, but the problem with Excel is that you have to build the entire application and have to make sure that it works. You therefore have to customise it to make it work for you. With other applications it is just a matter of implementing it and then getting the necessary training	1	Excel applications have to be built from scratch to facilitate the consolidation process

Co 1	It is also the case that we have been using Excel in the past, and we simply attempt to improve on the existing system.	3	A certain degree of inertia prevents companies from changing their consolidation system, even though it is not meeting the needs of the users.
Co 2	In terms of the complexity of these larger groups, it would be necessary to use specialised consolidation applications	1	Complex groups need specialised cons applications
Co 2	I think that with listed companies, the auditors will place more pressure on these companies not to do the consolidation on spreadsheets.	2	Auditors will place pressure on companies not to use spreadsheets
Co 2	I think there will be a drive to move more companies to perform the consolidation on specialised applications	2	There is a trend to use more specialised cons applications.
Co 2	We considered using an ERP system to perform the consolidation, but these ERP systems were not able to cope with our requirements.	2	ERP was not adequate to facilitate the consolidation process.
Co 2	HFM can also sit on top of any system. Because we have so many GL's in the group, it was easy to plug all that stuff into HFM.	6	One important consideration in the choice of application is the ease with which specialised applications receive interfaces from other applications.
Co 2	Also at the time, PWC internationally endorsed the product form an audit perspective.	7	The endorsement of auditors influences the choice of the application.
Co 3	I am quite surprised to see that. I would have thought that more people would use specialised type applications	1	Surprised at the pervasive use of spreadsheets for consolidation purposes

Co 3	What surprises me most is that companies that are geographically diversified, still use spreadsheets to perform the consolidation	1	Mentioned that spreadsheets are not appropriate for companies that are geographically diversified.
Co 4	The problem with SAP and Oracle, is that the implementation is VERY expensive. Then, the customisation of the system is also very expensive. And if you want to make a minor change, it often requires significant rework and can again be very expensive.	4	Cost of the system is an important consideration for smaller groups of companies: The cost to buy software; implementation; and changes that are made are factors that are considered.
Co 4	I think the consolidation is made easier because most of the companies operate on Pastel.	7	A consistent GL makes the consolidation easier to complete.
Co 6	Yea, from a personal point of view, I have a good understanding of how the system works and I find it easy to operate. But it might not be easy for someone else to work with.	6	The user is satisfied with the consolidation application.
Co 6	In my opinion, Accpac is better than, for example, SAP, where you have to perform allot of over-rides and make many more consolidation adjustments.	6	The user considers his application to be a better solutions than SAP. He thinks that in SAP, you have to make more manual adjustments.
Co 7	The auditors told us a few years ago that we will not be able to complete the 2009 consolidation without a Business Intelligence System. They thought one cannot do it in Excel.	4	The auditors are concerned about the use of spreadsheets to perform the consolidation.

Co 7	We have done the consolidation very successfully in Excel this year.	4	The consolidation is performed on spreadsheets and apparently done successfully despite the large number of subsidiaries.
Co 7	They thought one cannot do it in Excel. But I cannot see why we can't do the consolidation in Excel.	4	The user defends the use of Excel in order to perform the complex consolidation.
Co 7	I think that a more specialised system would actually delay our consolidation process because it is so much more rigid to change.	5	The user thinks that a more specialised system would delay the consolidation period.
Co 7	I would agree with you that the audit trail is less secure when Excel is used.	5	The user admits that the internal controls over the spreadsheet are limited.
Co 7	I would agree that it is easier to make changes to the Excel application that with other applications.	6	The user admits that the level of formalisation is less in a spreadsheet that with other applications.
Co 8	Since I have arrived here, the feeling I got is that since the system was implemented 3 years ago, there were almost no changes made to the system to keep up to date with changes with accounting standards. Instead of making the necessary changes to the system, the changes were made to the audit pack. So the system has lost it usefulness and is effectively being bypassed.	3	The consolidation system is not properly maintained. Little development has taken place in the past 3 years.

Co 8	Researcher: Why do you think the system was neglected? Did SI not have the necessary skills? Was the consultant not always available? Interviewee: I think users realised that there was a need and did consider it to be important. The implementation was a nightmare. Halfway through the implementation, many of the consultants actually left the organisation, which left SI with very few skilled people to implement the system. The consultant that we currently use is the only person that was involved with the initial implementation of the consolidation system. The system training was also inadequate	3	Lack of the technical skills to make changes to the consolidation application holds back any necessary development.
Co 8	I think the choice was mainly driven by the relative cost of different applications. Hyperion was considered, but it was too expensive	3	The cost of the consolidation application is an important consideration in the choice of the consolidation application.
Co 8	In my opinion, Outlooksoft is not the correct tool to use. I would have preferred to have spent a little bit extra money and used something like Hyperion, where you can exercise much better controls over the system	3	The user thinks that the current consolidation application is not the right application. The user thinks that more money should have been spent on a more suitable application.

Co 8	I would have preferred to have spent a little bit extra money and used something like Hyperion, where you can exercise much better controls over the system. But to go over a whole re-implementation of the system would be unfeasible	3	Inertia prevents the re-implementation of a new consolidation application.

2. Consolidation Period

Interviewee	Interview Quote	Page	Interpretive Comment
Co 1	Yes, that was mainly due to our financial director. I realise that it went out to SENS very quickly	4	The FD imposed strict reporting deadlines on accountants.
Co 1	Because it is a small company with the executive closely involved, it is not difficult to arrange a meeting to review the financial results	5	The small company, with the audit committee members that are around, makes it easier to publish on SENS rapidly.
Co 1	She says that the shareholders have come to expect the results to be published very rapidly. I also think that the FD wanted to impress some of our major shareholders, such as a few hedge funds.	6	FD says that the shareholders have come to expect early SENS publication
Co 1	Yes, around 16 hours per day.	6	Work very long hours over the consolidation period in order to publish on SENS rapidly.
Co 1	I think it is more to do with the tight deadline than anything else. An extra 2 weeks would make things much easier.	7	Considers the time allowed completing the consolidation to be excessively short - this could lead to a reduction in the reliability of the AFS.
Co 2	Here we are not very fast. If you compare us to the other major banks, we publish somewhat slower.	5	Compare themselves to their peers in terms of the time taken to publish on SENS

Co 2	But the second, consolidation phase, FR takes somewhat longer.

Interviewee: That would make sense, since our consolidation is complex due to the number of entities that are contained in the group | 5 | The consolidation for complex groups takes longer to complete |
Co 2	During this process we have to go back to the subsidiaries and question the data which they submitted	5	The validation of data that is submitted takes a long time. There is therefore a perception that greater formalisation will delay the consolidation process.
Co 2	Also with our system that is less sophisticated, we will necessarily take longer to complete the consolidation.	5	Perception that a less sophisticated system will result in the consolidation process to take longer to complete.
Co 2	And also, we control our consolidation process to a greater extent, and would therefore also take somewhat longer.	5	Perception that a more formalised consolidation system will result in the consolidation period to take longer.
Co 2	You know, the quality of information is a big thing for us, particularly during the past year-end when we implemented IFRS7	5	The poor quality of the data that is submitted by the subsidiaries causes a delay in the consolidation.

Co 2	You know, the quality of information is a big thing for us, particularly during the past year-end when we implemented IFRS7. That required a great deal of additional analysis.	5	The implementation of IFRS is a significant problem and caused some delay to the consolidation process, particularly because it reduced the reliability of the data that was submitted.
Co 2	The accountants are so pressurised, they keep chasing their tails. They do not have the time to sit and think these issues through until year-end when the auditors come in	5	The time pressure on accountants does not allow them any opportunity to consider the implications of IFRS on their operations. This time pressure therefore would necessarily reduce the quality / reliability of the submitted data.
Co 2	Accountants spend so much time reconciling one system with another that they have little time left for other, more important proactive activities	6	Lack of integration requires much time to be spent on the reconciliation of systems, and therefore delays the consolidation process.
Co 3	For me, the translation of foreign currencies takes a long time and the proof of FCTR is time consuming	1	Translation of foreign currencies take a long time
Co 3	One can normally get quickly from A to B, but they force you to go via the Cape, which adds a lot of additional steps	4	Considers the formalisation of the system to delay the consolidation process.

	We like to get the data in fast so that if there are any problems, we will be able to warn the market in advance of the publication of the listed results. We normally let the market know if the results will be better or worse that expected.		Strict reporting deadlines are imposed in order to keep the shareholders informed
Co 3		5	
Co 3	You will find that all the mines publish around that date. You will see that Anglo will publish on day one, we on day two, Harmony on day three, and so forth. The next quarter end, another company will get chance to publish first, each mine gets its turn. There is a gentlemen's agreement who will publish when.	5	The publication date of every company is agreed upon by the industry.
Co 3	It often happens that we are finished with the consolidation process, but we then have to wait our turn.	5	Due to the industry agreement on the date at which the financial results will be published, the consolidation is completed long before the publication date.
Co 3	Researcher: Why would you say it is that you are able to complete the consolidation so rapidly? Interviewee: Well, it takes me a matter of seconds to dump the financial results from the subsidiaries into FDC.	6	The consolidation process takes less time due to the high level of integration.
Co 4	The reason why the 3rd phase takes so long is that the auditors really delayed the entire process.	2	Auditors are considered a delay to the year-end process

Co 4	The pressure on the subsidiaries to submit their data so fast is more of a control.	3	Rapid submission of the financial results by the subsidiaries are considered a form of internal control.
Co 4	I think the system is great, but the pressure on the accountants at the subsidiaries is too much.	5	The pressure exerted on accountants at subsidiaries is considered to be excessive.
Co 6	We have found that you can try to get the information published sooner, but the board decides when they would like to publish the financial statements at a certain date and the accountants simply have to deliver.	6	The date at which the financial results are published is set by the board. Accountants simply have to deliver on that date.
Co 7	What does make the Europe consolidation more complex is that we had to wait for the Europe consolidated figures for a long time, and then had to complete the consolidation very rapidly when the figures were available.	5	There is a trade-off between relevance and reliability. The process might be completed very rapidly, but the reliability of the data that is submitted could be questioned. Another factor that should be controlled for is the quality of the accountants at the subsidiaries.
Co 7	It was not our Auditors which is Deloittes, but rather KPMG who came in to investigate some of our processes.	5	Auditing firm was concerned about the use of the spreadsheet to complete the consolidation.
Co 7	I think that a more specialised system would actually delay our consolidation process because it is so much more rigid to change.	5	The user thinks that a more specialised system would delay the consolidation period.

Co 8	Researcher: Is there any pressure from the CFO to reduce the time taken to complete the year-end process? Interviewee: No, it seems that the CFO is satisfied with the time taken.	4	The CFO is satisfied with the period taken to complete the consolidation.
Co 8	Researcher: Is there any pressure from the CFO to reduce the time taken to complete the year-end process? Interviewee: No, it seems that the CFO is satisfied with the time taken. The reason why I would like to reduce the time is that it will provide us with additional time to analyse the information that is submitted.	4	A shorter period to complete the consolidation should allow the accountants additional time to review the submitted figures.
Co 8	And also, during a typical year-end process, users do not keep to the 20 working day requirement. Half of the users would submit by 20 days, while some would take 25 days, and others would eventually submit on 30 days. So that effectively reduces the time that you have available for the consolidation.	4	The submission deadline is not strictly enforced: This reduces the period available for the consolidation to be completed.

Co 8	Researcher: Are the financial statements linked into the consolidation system? Interviewee: You can link it, but nobody has gone to the effort of linking the financial statements into the consolidation system. This is one process where we can save a great deal of time. Another factor that also prevents us from properly integrating the financial statements is that the chart of accounts does not facilitate the preparation of the AFS.	6	Financial statements are not at all integrated with consolidation system. This requires a lot of manual work and therefore delays the publication of the financial statements.
Co 8	As far as management reports are concerned, most of that is linked into the system. Here there is very little manual input. The big problem is the AFS where there is absolutely no link with the system. Such a link could save a great deal of time. Since we do not own 100% of all the subsidiaries, we have to prepare separate financial statements for all these companies.	7	Greater integration (which is currently lacking) has the potential to save a lot of time during the consolidation.

3. Formalisation

Interviewee	Interview Quote	Page	Interpretive Comment
Co 1	I would say that one of the main difficulties these large companies have is to keep track of all the data submitted by the large number of subsidiaries.	2	Controlling data is a very important function of the consolidation application. The level of control that can be exercised over a large volume of data by specialised consolidation applications is an important consideration.
Co 1	However, what is of concern to me is the protect-ability of the cells. It is so easy to put the wrong formulae into the spreadsheet, which I suppose can happen on any application, and then cause a serious mistake in the financial results.	3	The user is concerned about the level of formalisation that can be enforced by means of a spreadsheet.
		3	Lack of formalisation is expected to lead to errors in the AFS.
Co 1	However, as far as changes to the workbook are concerned, we do not control that closely.	3	The interviewee was aware and somewhat concerned about the lack of change control over changes to the consolidation system.
Co 1	Many formulae are also checked by the FD. So our controls are more of a checking function than proactive controls.	4	Lack of formalisation is compensated by increased review of the financial statements.

Co 1	It is working for us, but going forward it is something that we will look at and attempt to be more proactive and prevent mistakes from happening.	4	Intend to improve the level of formalisation
Co 1	I think that if many more people were to be involved in the process, then it would be an issue of what is whose responsibility and who did what, and then a more formalised system might be necessary with stricter change controls.	4	If the company does grow, then the formalisation would need to be improved.
Co 1	I think that if many more people were to be involved in the process, then it would be an issue of what is whose responsibility and who did what, and then a more formalised system might be necessary with stricter change controls.	4	The greater the number of people involved with the system, the greater the level of system formalisation would be necessary.
Co 1	Researcher: Do you think that you will get a different application if the group continues to grow at its current rate? Interviewee: Yes, especially in order to formalise the process more. I think we will consider the Pastel consolidation module.	7	Interviewee thinks that a new cons application will be necessary in order to increase the formalisation of the process.
Co 2		2	Auditors were concerned about the use of spreadsheets during the consolidation for the large group.

Co 2	Our system has the ability to generate these accounting entries, but we do not make use of that capacity.	2	The cons system is capable of increased sophistication, but decided against its use. Preferred to manually perform certain functions in order to increase control (formalisation) over the process.
Co 2	In HFM, you can build rules that will make those adjustments, but we have not gone that far. Our group structure changes often and the accountants prefer to make these consolidation entries manually. I suppose it is a matter of the level of trust they have with the system's ability to do these adjustments correctly	3	Prefer to post certain journal entries manually to increase the control over the process (formalisation) at the expense of sophistication.
Co 2	Where accountants feel they need to control those important accounting entries, rather than relying on a black-box to perform these accounting entries.	3	Users often do not understand the way in which the values in the system are calculated. Therefore, users prefer to manually calculate important values in order to increase control.
Co 2	From our point of view, we would not receive a great deal of benefit from quite significant changes we would have to make to the system. Those system changes would also involve significant risks	3	The system is not changed because such changes would require too great a risk. Formalised systems prevents frequent minor changes to the system

Co 2	Researcher: Let's look at the formalisation of your system. This is concerned with things like the access and viewing rights of the system. Here you scored very high. Interviewee: Yes, we worked very hard to achieve that score	4	The company worked very hard to increased formalisation
Co 2	Some time ago, the auditors were very concerned about the controls over the system, but we have not been in the auditors report for the last 2 years.	4	Auditors were concerned about the low level of formalisation. Auditors encouraged greater formalisation of the system.
Co 2	During this process we have to go back to the subsidiaries and question the data which they submitted.	5	The validation of data that is submitted takes a long time. There is therefore a perception that greater formalisation will delay the consolidation process.
Co 2	And also, we control our consolidation process to a greater extent, and would therefore also take somewhat longer.	5	Perception that a more formalised consolidation system will result in the consolidation period to take longer.
Co 2	We are also very happy with the auditability of the system and the version control and the security that can be applied	7	The formalisation of the system is important to the company and they are satisfied with its level of formalisation.

Co 3	Since we are listed in the New York stock exchange we have to comply with the Sarbox legislation. This forces us to implement very strict internal controls that are checked every month by a lady from the internal auditors.	4	Regulation (Sarbox) forces higher levels of Formalisation on the consolidation application.
Co 3	For example, she will investigate whether the data file that is submitted from the mines, is exactly what appears on the system. And many more checks – I call it the Sox irritations	4	Considers much of the internal controls to be an irritation - unnecessary.
Co 3	Researcher: Do you think all these Sox checks are a bit of an overkill? Interviewee: I think so	4	Considers the level of internal controls to be excessive.
Co 3	One can normally get quickly from A to B, but they force you to go via C, which adds a lot of additional steps	4	Considers the formalisation of the system to delay the consolidation process
Co 3	Researcher: So do you review the data that is submitted?\n\nInterviewee: Yes, it is my responsibility	7	Lack of quality of the data requires additional review of the data.
Co 4	All this information will be reviewed by the 2 group financial managers, and then a number of queries will be sent to the subsidiaries.	3	The packs submitted by the subsidiaries are reviewed to confirm reliability.
Co 4	The internal controls over the year-end process are very important to the group.	5	Regard internal controls over the year-end process to be important.
Co 4	Regarding the general internal controls, I think we can certainly improve there.	5	Consider the level of internal controls over the year-end process to be insufficient.

Co 4	I appreciate that the audit process will take a long time, but what irritates me is that 5 different clerks would come and ask you the same question – and that really wastes unnecessary time.	6	The audit process takes too long.
Co 4	I appreciate that the audit process will take a long time, but what irritates me is that 5 different clerks would come and ask you the same question – and that really wastes unnecessary time.	6	The audit process causes irritation.
Co 4	But I do not think that the company regards it [more internal controls are needed over the system] as a priority.	7	Does not think more internal controls are needed over the system is a priority.
Co 4	I also think that greater formalisation will necessarily result in some delays in the system.	7	Think that greater system formalisation will delay the consolidation process.
Co 5	So 2 weeks before we publish, everything is final. This two week period provides the group audit committee with sufficient time to prepare to ask the executive management the necessary questions. So it is a bit of hurry-up-and-wait situation. But it is good corporate governance. The bank places a great deal of emphasis on good corporate governance and to allow people with enough time to analyse the financial results.	6	Corporate governance is very important to the bank, and this has an impact on the internal controls (formalisation) of the consolidation system.
Co 5	So with this kind of integrated system, you would be able realize quickly that there is a difference between a line item on the financial statements and the total on the note.	7	Better integration will enable improved validation of disclosure items that are currently captured separately.

Co 6	Spreadsheets are fine, as long as you bring all the financial results into the main consolidation spreadsheet	2	The control of the data is an important element of the consolidation application.
Co 7	I think that a more specialised system would actually delay our consolidation process because it is so much more rigid to change	5	The user thinks that a more formalised system would delay the consolidation period.
Co 7	I would agree with you that the audit trail is less secure when Excel is used	5	The user admits that the internal controls over the spreadsheet are limited.
Co 7	I would agree that it is easier to make changes to the Excel application that with other applications	6	The user admits that the level of formalisation is less in a spreadsheet that with other applications.
Co 8	Something else is that the system in not very formalised and we do not even have a system administrator for Outlooksoft.	2	User acknowledges that the system is not formalised.
Co 8	I would have preferred to have spent a little bit extra money and used something like Hyperion, where you can exercise much better controls over the system. But to go over a whole re-implementation of the system would be unfeasible.	3	The user is aware that the application lacks formalisation - and it should be improved. (Is this their true feelings, or are they simply expressing that view because they know that it is the right thing to say?).

Co 8	Researcher: Is there any pressure from the CFO to reduce the time taken to complete the year-end process? Interviewee: No, it seems that the CFO is satisfied with the time taken. The reason why I would like to reduce the time is that it will provide us with additional time analyse the information that is submitted.	4	A shorter period to complete the consolidation should allow the accountants additional time to review the submitted figures - thereby increasing the formalisation.
Co 8	Once we receive the packs from every subsidiary, we would check it to determine whether it makes sense and if there are any large errors.	5	The data submitted by the subsidiaries are reviewed for reliability.
Co 8	There are no formal processes that we follow to make any changes. It is literally, you pick up the phone and ask him to correct the error. The consultant will then come back to use and let us know that the error has been resolved, without providing us with an explanation of the cause of the error or what he had to change to sort it out. I would say that here we should improve our understanding of his solutions and also what caused the error. We also would not know, in a year's time from now, what caused these problems and how did we resolve it. I think we need an improved audit trail.	8	Any changes to the system are not properly controlled. There is a desire to improve the formalisation of the system.

4. Integration

Interviewee	Interview Quote	Page	Interpretive Comment
Co 1	The pack is organised in a management accounting format that includes the Pastel account numbers, because all the subsidiaries are running on Pastel.	2	A consistent GL is used by all subsidiaries.
Co 1		3	Additional disclosure items are not integrated with the consolidation application. A parallel system is used to capture the information necessary for IFRS disclosure.
Co 1	I think in the future there will be some room for improvement, particularly with the linking of the financial statements to the consolidation spreadsheet.	7	Realise the need to improve the integration of the AFS with the consolidation application.
Co 2		4	GL data is well integrated, but disclosure data is manually captured on the system
Co 2	We have to manually capture that non-financial information into HFM, and then there are validations that run to determine whether those amounts agree with the financial information	4	Additional validation checks have to be run in order to check figures that are not integrated with the system.

Co 2	Just yesterday I looked at a system architecture diagram of a part of our IT systems and the information flows all over the place. As a result, accountants spend so much time reconciling one system with another that they have little time left for other, more important proactive activities	6	Lack of integration requires much time to be spent on the reconciliation of systems, and therefore delays the consolidation process.
Co 2	HFM can also sit on top of any system. Because we have so many GL's in the group, it was easy to plug all that stuff into HFM	6	One important consideration in the choice of application is the ease with which specialised applications receive interfaces from other applications.
Co 3	Well, our management reports are all automatically updated with the financial information. However, the annual financial statements have to be manually typed	3	Management reports are integrated with the system, but the FS are not.
Co 3	Researcher: Why would you say it is that you are able to complete the consolidation so rapidly? Interviewee: Well, it takes me a matter of seconds to dump the financial results form the subsidiaries into FDC.	6	The consolidation process takes less time due to the high level of integration.
Co 4	We would then perform a check to see if there are not any significant differences.	2	Disclosure information is not integrated with the consolidation application. Some validation checks exist between the packs and GL

Co 4		3	Disclosure information is captured on a separate spreadsheet
Co 4	I think a great advantage is that most of our subsidiaries are on Pastel and so we receive a standard interface from them	4	The use of a consistent GL by all subsidiaries makes integration easier
Co 5	There should not be a separate reporting package that supplies management with information that by-passes the consolidation system. The management reports used by the business units often look different from that of the consolidated reports	6	A need exists to improve the integration of the reports of the consolidated data.
Co 5	There is another thing that I would spend money on, that is where you capture you disclosure items on the consolidation system itself. Currently, we use a separate spreadsheet to capture this kind of information.	7	There is a need to improve the integration of disclosure items are captured on a spreadsheet.
Co 5	So with this kind of integrated system, you would be able realize quickly that there is a difference between a line item on the financial statements and the total on the note.	7	Better integration will enable improved validation of disclosure items that are currently captured separately.
Co 5	With us, it is a manual exercise, where you first perform the consolidation and then attempt to build up the detail of the items in the financial statements. We use a very convoluted exercise that is back-to-front	7	The disclosure items are not at all integrated with the consolidation system.

Co 6	We aim to get to the point where all the subsidiaries use the same version of the software	1	Aspire to have one accounting system for the entire group, which is expected to simplify the consolidation
Co 6	The information that we capture in the accounting packs of the subsidiaries do not all feed through to Accpac and ideally I would like all this information to be captured into Accpac	5	Additional disclosure information is captured on a separate spreadsheet. This spreadsheet does not integrate with the consolidation application. Would like this information to be integrated.
Co 8	Lost of the calculations do not work as it is supposed to, and the audit pack requires a lot of manual input of data that is already in the system.	2	The audit pack is not integrated which requires a lot of manual input
Co 8	This copying over of data does not take place automatically. This therefore requires a great deal of manual input data	2	The Statutory data is not integrated in the system. This requires a lot of manual work.

Co 8	Researcher: Are the financial statements linked into the consolidation system? Interviewee: You can link it, but nobody has gone to the effort of linking the financial statements into the consolidation system. This is one process where we can save a great deal of time. Another factor that also prevents us from properly integrating the financial statements is that the chart of accounts does not facilitate the preparation of the AFS	6	Financial statements are not at all integrated with consolidation system. This requires a lot of manual work.
Co 8	As far as management reports are concerned, most of that is linked into the system. Here there is very little manual input. The big problem is the AFS where there is absolutely no link with the system. Such a link could save a great deal of time. Since we do not own 100% of all the subsidiaries, we have to prepare separate financial statements for all these companies	7	Greater integration (which is currently lacking) has the potential to save a to of time during the consolidation.
Co 8	This could be a substantial benefit, but we have not spent time or money in this. This is also impacted by the system that has not been kept up to date with the changing requirements of the users.	7	Despite the apparent benefit of a more integrated system, the company does not invest money into it.

5. Other Systems

Interviewee	Interview Quote	Page	Interpretive Comment
Co 2	The fixed assets are automatically loaded in to HFM, but the other non-financial information is loaded manually	4	The fixed asset system is mentioned and how it impacts on year-end process.
Co 2	Just yesterday I looked at a system architecture diagram of a part of our IT systems and the information flows all over the place.	6	There are multiple other systems that impact on the consolidation system. The consolidation system is merely one system in a web of inter-dependent systems.
Co 5	So our system does work and we get the results out and we publish on-time, but there are significant work arounds.	2	The consolidation system is inadequate & there are many manual processes to compensate for the system's inadequacy.
Co 5	Researcher: Is the information in SAP to perform the eliminations. Interviewee: Yes, it is in SAP, each transaction with their inter-company partner. But there are naturally differences. In order to resolve those differences takes a lot of effort	4	Inter-company transactions are reconciled in SAP. This reconciliation is a big problem and takes a ling time.

Co 5	There is an investment database, which if it has been set up correctly, then these eliminations would be done automatically.	5	An investment database is maintained where the information relating to any investment is captured so that the elimination can happen automatically.
Co 5	There is another thing that I would spend money on, that is where you capture you disclosure items on the consolidation system itself. Currently, we use a separate spreadsheet to capture this kind of information.	7	Disclosure items are captured on a spreadsheet which is not integrated with the consolidation application.
Co 6	We have a spreadsheet on which we capture all our inter-company transactions	3	A separate spreadsheet is used to capture all the inter-company transactions - this spreadsheet is not the consolidation application
Co 8	Since I have arrived here, the feeling I got is that since the system was implemented 3 years ago, there were almost no changes made to the system to keep up to date with changes with accounting standards. Instead of making the necessary changes to the system, the changes were made to the audit pack. So the system has lost it usefulness and is effectively being bypassed.	3	The consolidation has not been maintained in the last 3 years. As a result, other systems are used to bypass the consolidation application because the consolidation application is not able to facilitate any changes.

Co 8	Overall, I think Outlooksoft is not a bad tool. I think we can improve many of the processes that function around our consolidation system.	9	Mentions that the consolidation is OK, but that many other processes that function around the consolidation process are inadequate and that if improvements are made to these processes, then the consolidation process would benefit.

6. People

Intervi ewee	Interview Quote	Page	Interpretive Comment
Co 2	In order to improve the quality of the information, we have to educate the finance community and work closely with them to understand what their businesses are all about	5	A significant amount of time and money was spent on educating accountants at operations on the impact of IFRS
Co 2	the quality of information is a big thing for us, particularly during the past year-end when we implemented IFRS7. That required a great deal of additional analysis. The understanding of the accountants out there was not up to scratch.	5	The quality of accountants impact on the reliability of the data they submit to group.
Co 2	Other issues that also compounds the lack of quality information is high staff turnover, people leaving the country	6	High Staff turnover impacts on the quality of the information that was submitted.
Co 3	You have to understand how the cash flow works, and unfortunately the accountants on the mines do not always understand the cash flow	3	The quality of accountants at the subsidiaries impacts on the reliability of the data they submit to group.
Co 3	Researcher: In terms of the quality of the data that is submitted. Do you have any problems with that? Interviewee: There are always some issues with the data. Especially with tax	6	There are concerns about the quality of the data that is submitted to group.

Co 3	Another problem is the work-in-progress. This figure is manipulated by management in order to smooth the results of mines. They would often not declare some production if they exceed their targets, and release it in the next period.	7	There are reason to doubt the reliability of the data that is submitted to group.
Co 5	Researcher: Is the onus not on the subs to resolve these differences before they submit their results to you? Interviewee: Correct, but this is where discipline comes in. The group has grown very rapidly without the necessary people in strategic places with the right discipline in order to resolve such differences before it reaches us. So at group level, we do get many items that do not match.	4	The quality of the accountants at the subsidiaries impacts on the reliability of the data that is submitted to group.
Co 5	The next thing that I will do is to run a very strong awareness campaign to let then understand how their actions impact the group consolidation. I will therefore fly in employees from across the world and let them understand the implications of their transactions. This will encourage a feeling of cohesion and discipline	6	The education and training of people is considered to be very important. Better education will help accountants to appreciate the impact of their actions.

Co 8	Another factor that also prevents us from properly integrating the financial statements is that the chart of accounts does not facilitate the preparation of the AFS. There is therefore a need for many reallocations	6	Lack of experienced consultants prevents the system from being changed as necessary. This has implications on the integration, because the a lot of manual work is required to get the data in the right format.
Co 8	We are therefore very reliant on this consultant, and nobody knows how to make these corrections, except for this consultant. I think the ideal solution would be to get a systems administrator who will be able to make these corrections.	6	Nobody in the organisation knows how certain calculations are performed. (Black-box) They are over-reliant on the consultant. The company is not able to change the consolidation application because they do not understand how it works.
Co 8	And the current users also do not necessarily know the system adequately in order to provide the training. I think that most users do not even know what the system is capable of. A few users have phoned me and asked if training could be provided to them. I also do not think that Outlooksoft offers formal administrator training	9	Lack of user training impacts on the actual sophistication of the system because they do not know how to use the system and the functionality that is available.

7. <u>Sophistication</u>

<u>Intervi ewee</u>	<u>Interview Quote</u>	<u>Page</u>	<u>Interpretive Comment</u>
Co 1	We have a relatively small number of entities that are all wholly owned. And only some of them are active	2	When asked whether the sophistication of the consolidation application is adequate, the interviewee mentioned the number of entities in the group and saying that it is a proper match. It is important to note that the turnover was NOT mentioned.
Co 1	We want to make sure that the spreadsheet can handle these new acquisitions correctly before we will be willing to rely on it.	2	Corporate reorganisation puts the consolidation under stain. Users are not sure that the system is capable of correctly dealing with those transactions.
Co 1	However, it would be nice if we could push a button and out pops the consolidated financial statements	7	Would like to increase sophistication, in the expectation that it will require less work by accountants during the year-end process.
Co 1	Our biggest problem is the reconciliation of the inter-company accounts	7	Biggest problem is the reconciliation of inter-group transactions

Co 2	Our system has the ability to generate these accounting entries, but we do not make use of that capacity	2	The cons system is capable of increased sophistication, but decided against its use. Preferred to manually perform certain functions in order to increase control over the process
Co 2	In HFM, you can build rules that will make those adjustments, but we have not gone that far. Our group structure changes often and the accountants prefer to make these consolidation entries manually. I suppose it is a matter of the level of trust they have with the system's ability to do these adjustments correctly	3	Prefer to post certain journal entries manually to increase formalisation, at the expense of sophistication.
Co 2	But I think that such rules work in a very stable entity structure.	3	Sophistication is dependent on the stability of the group structure. Increased changes requires an increased sophisticated system.
Co 2	Also with our system that is less sophisticated, we will necessarily take longer to complete the consolidation.	5	Perception that a less sophisticated system will result in the consolidation process to take longer to complete.
Co 3	The elimination of inter-group transactions are also not performed automatically because we prefer to do that manually	1	Prefer to manually eliminate inter-company transactions

Co 3	I would have liked if the system was able to automatically calculate the tax rates of the mines. The cash-flow is also a problem. The accountants on the mines perform a balance sheet to balance sheet cash flow. This cash flow is not a true cash flow, because for example, they do not eliminate their provisions.	2	When sophistication was discussed, mentioned the Tax calculations and Cash flow calculations as important.
Co 3	Researcher: So is there something specifically that you would wish the system could perform automatically? Interviewee: Yes, balance my cash flow	3	One aspect that is particularly lacking in relation to sophistication is the Cash flow.
Co 3	Researcher: Finally, if there is one issue related to the consolidation system that you would love to solve, what would that be? Interviewee: I would say that the inter-company process is the biggest headache	7	Inter-company reconciliations is a major concern and the biggest problem.
Co 8	Lost of the calculations do not work as it is supposed to, and the audit pack requires a lot of manual input of data that is already in the system.	2	Many calculations in the consolidation system does not work as it should.
Co 8	And the current users also do not necessarily know the system adequately in order to provide the training. I think that most users do not even know what the system is capable of. A few users have phoned me and asked if training could be provided to them. I also do not think that Outlooksoft offers formal administrator training.	9	Lack of user training impacts on the actual sophistication of the system because they do not know how to use the system and the functionality that is available.

Appendix D – Letters of Endorsement

The following letter of endorsement was issued by the South African Institute of Chartered Accountants. This letter was attached to the self-completion questionnaire and sent to potential research participants.

The South African Institute of Chartered Accountants

6 June 2008
Ref: 208982/hh

TO WHOM IT MAY CONCERN

CONSOLIDATION SYSTEMS RESEARCH

Pieter Smith is in the process of conducting academic research with the aim of completing a doctorate degree at the University of Durham, UK. His research investigates certain aspects of the accounting consolidation systems used by companies that are listed on the Johannesburg Securities Exchange (JSE).

Mr Smith is a Chartered Accountant (SA). The South African Institute of Chartered Accountants (SAICA) encourages such research and recognises its potential in contributing towards both theory and practice.

SAICA endorses the research undertaken by Mr Smith, but we would emphasise that participation is voluntary. Participating companies will remain anonymous and all information revealed will be treated confidentially.
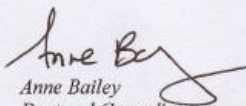
Yours sincerely

GV Terry
Head: Office of Executive President

Integritas 7 Zulberg Close Bruma Lake 2198 P O Box 59875 Kengray 2100 DX92 Johannesburg Tel: (011) 621 6600 Fax: (011) 622 3321
E-mail: queries@saica.co.za Websites: http://www.saica.co.za and http://www.accountancysa.org.za NPO – 020 – 050
A member of the International Federation of Accountants (IFAC) and the Eastern Central and Southern African Federation of Accountants (ECSAFA)

The following letter of was issued by Durham Business School in order to confirm that the researcher is a registered student. This letter was attached to the self-completion questionnaire and sent to potential research participants.

Durham
Business School

makers of business leaders

8th May 2008

TO WHOM IT MAY CONCERN

Dear Sirs

Pieter Smith
Student ID 000508012

I am writing to confirm that the above named person is a registered student with the University of Durham.

Course Details

Name of Course:	DBA (Doctorate of Business Administration)
Type of Course:	Part Time Research Degree
Start Date:	January 2006
Finish Date:	December 2011
Expected Graduation Date:	July 2012

The Students Address is:
PO Box 70
Featherbrooke Estate
South Africa
1746

Pieter has entered the research phase of the DBA programme.

Yours faithfully

Signed:
Name: Anne Bailey
Position: Doctoral Co-ordinator

Durham
Business School

I:\doctoral office\doctoral programmes\dba durham\dba 5\dba 5 participants\smith pieter\letters\roni ajao confirmation of student letter may 08.doc
Durham Business School Durham University Mill Hill Lane
Durham City DH1 3LB United Kingdom
Telephone +44 (0) 191 334 5200 Fax +44 (0) 191 334 5201
www.dur.ac.uk/dbs

EQUIS
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Appendix E – Participant Research Results Report

A report that contained the general results of the research and also included some participant specific results was sent to every research participant. A copy of such a report has been included below. In order to guarantee anonymity, the name of the participant to which this report relates has been removed and replaced with "Co X Ltd". Each report was sent to the actual person at the participating company who completed the questionnaire. These reports were saved in an Adobe Acrobat document (.pdf) format and e-mailed to participants. The English and Afrikaans versions of the accompanying e-mails have been included below.

1. English Version of the E-Mail that Accompanied the Research Report

Dear <<participant name>>

During the latter half of 2008, you completed a questionnaire in connection with the consolidation system that was used by Co X Ltd. Your participation was greatly appreciated and contributed towards a very good response rate. In total, **210** questionnaires were completed on behalf of JSE listed companies, which provided a response rate that exceeds 50%.

The attached report includes extracts from the research results and also indicates how Co X Ltd performed relative to other participants. Be assured that the information revealed in the questionnaire will remain confidential.

A more complete version of the research results will be presented during a free public lecture on 1 April, held under the auspices of the South African Institute of Chartered Accountants (SAICA). The attached invitation provides more detail regarding the lecture.

Do not hesitate to contact me if you would like to obtain additional information about the public lecture or the research.

Yours sincerely
Pieter Smith
+27 (0)79-525-3718

2. Afrikaans Version of the E-Mail that Accompanied the Research Report

Beste <<participant name>>

Gedurende die tweede helfte van 2008 het jy 'n vraelys met betrekking tot die konsolidasiestelsel wat deur Co X Ltd gebruik word, voltooi. Ek het jou deelname opreg waardeer. **210** vraelyste is deur verteenwoordigers van JSE gelyste maatskappye voltooi, en het 'n responskoers van meer as 50% gelewer.

Hierby aangeheg is 'n verslag wat bepaalde bevindinge van die navorsing reflekteer. Die verslag dui onder andere aan hoe die konsolidasiestelsel wat Co X Ltd gebruik, vergelyk met dié van ander maatskappye. Die inhoud van die vraelyste word vertroulik hanteer.

'n Meer volledige weergawe van die navorsingsresultate sal gedurende 'n gratis openbare lesing, wat op 1 April 2009 deur die Suid-Afrikaanse Instituut vir Geoktrooieerde Rekenmeesters aangebied word, voorgelê. Die aangehegte uitnodiging bevat verdere inligting oor die lesing.

Kontak my gerus vir enige inligting rondom die navorsing of die openbare lesing.
Groete
Pieter Smith
+27 (0)79-525-3718

Consolidation Systems Research

Participant Report

February 2009

Co X Ltd

Confidential

Author: Pieter Smith, CA(SA), MBA

Pieter.r.smith@gmail.com, 079-525-3718

1. Introduction

This report presents an extract of the findings of research into the design and use of consolidation systems by companies that are listed on the Johannesburg Securities Exchange (JSE). The research was performed in order to fulfill part of the requirements of a doctorate degree at Durham University (UK). The principal research data collection method was self-completion questionnaires that were distributed to the group accountants or consolidation system administrators of JSE listed companies. 210 completed questionnaires were returned which yields a response rate of more than 50%, thus providing a representative sample of JSE listed companies and consequently a reliable data set. The questionnaires were followed up by eight in-depth interviews that provided a more detailed understanding of the design and use of consolidation systems as part of the consolidation process at participating companies. The research fieldwork was conducted from June to November 2008. The JSE Handbook and the JSE SENS system provided additional public information, specifically relating to the turnover and the publication date of the financial results of participating companies. Company specific information obtained by means of the questionnaires and interviews has been treated confidentially and all participants will remain anonymous.

The completion of consolidated group financial statements is required by International Financial Reporting Standards (IFRS) for all reporting entities that involve business combinations. IFRS3 (2005) specifies that all business combinations should be consolidated according to the purchase method. The application of this method is a complex process by which the results of subsidiaries, joint ventures and associate companies are adjusted and then combined into one set of consolidated financial statements of the parent company. Until relatively recently, most financial consolidations were performed by means of spreadsheet applications, such as Microsoft Excel. Spreadsheets were used either as the foundation of the consolidation processes or, at large companies, to supplement a consolidation process that is performed in the general ledger or ERP system. However, the current trend of large or complex groups of companies is to make use of other types of financial consolidation applications.

Accountants appear to regard the use of spreadsheets to consolidate the financial statements of *listed* companies as unusual. The use of spreadsheets as the consolidation tool for large companies also seems to be frowned upon by auditors. This report present empirical evidence to demonstrate in which circumstances spreadsheets are appropriate and, conversely, when other types of solutions are more suitable as the principal consolidation application.

2. Consolidation Application Grouping

Consolidation applications were divided into three groups in order to facilitate one part of the analysis that was conducted during the research. The three consolidation application groups were:

4. Spreadsheets and customised databases. Hereafter referred to as spreadsheets.
5. Consolidation modules that form an integral part of the General Ledger (GL) or Enterprise Resource Planning (ERP) application of the listed holding company. Hereafter referred to as GL or EPR.
6. Specialised consolidation applications.

The primary consolidation application used by Co X Ltd was Analyst Finacials, which was grouped in the Spreadsheet or Customised Database (blue) group.

It emerged clearly from the research that spreadsheets are used, almost universally, by accountants as an integral part of the process to prepare the consolidated financial statements of listed companies. However, the extent of reliance on spreadsheets during the consolidation process varies considerably. 62% of participants indicated that spreadsheets were the principal application which was used during the consolidation process. Consolidation modules that form an integral part of General ledger (GL) or ERP applications were used by 18% of participants, while 20% made use of specialised consolidation applications (Figure 1). However, even those companies who indicated

that their principal consolidation application was either a GL/ERP, or a specialised consolidation application, also made widespread use of spreadsheets to complement their principal consolidation application. In such cases, spreadsheets facilitated a range of other consolidation functions such as the creation of management reports, reconciliation of inter-group transactions, the collection of additional disclosure information and the drafting of the annual financial statements.

Figure 1: Principal Consolidation Application Grouping

The relatively high percentage of companies that relied exclusively on spreadsheets during the consolidation process was unexpected. This figure is particularly surprising when compared to the results of a 1996 survey of a sample of American companies, during which it emerged that merely 6% of respondents made exclusive use of spreadsheets to consolidate the financial statements, while 54% used specialist consolidation systems. The article, in which the results of the somewhat dated survey were published, unfortunately did not provide either any information regarding the size and the representativeness of the sample, or the profile of participating companies – such as the group turnover or the number of subsidiaries contained in the group.

Consequently, it is difficult and possibly imprudent to make direct comparisons to or definite inferences from the results of the American survey. Nevertheless, it should be safe to conclude that the extent to which South African listed companies rely on spreadsheets during the consolidation process is greater than that of American companies.

However, empirical evidence suggests that valid reasons exist for the widespread use of spreadsheets during the consolidation process. An analysis of the turnover of companies that use the three different groups of consolidation applications revealed a clear trend: Listed groups with a relatively small turnover tend to favour spreadsheets, while groups with relatively larger turnover use the consolidation module that forms part of the GL/ERP applications, and the groups with the largest reported turnover use specialised consolidation applications.

Figure 2: Group Turnover by Consolidation Application Type

Figure 2 presents the turnover of research participants according to the application type that was used during the consolidation process. The bars on the graph indicate the 10th to

the 90th percentile range in reported group turnover, while the lines on the bars indicate the average. The graphs reveal that the 90th percentile of turnover for groups that use spreadsheets is R9.1 billion, while the turnover for GL/ EPR and specialised consolidation applications is R40.3 billion and R59.3 billion respectively. This trend should neither be interpreted that listed companies with relatively large turnover make exclusive use of specialised consolidation applications; nor that companies with relatively smaller turnover use spreadsheets exclusively.

An even clearer trend emerges when the extent of decentralisation in listed groups is considered in terms of the type of consolidation applications that are used. Group decentralisation refers to the number of entities in which the listed group is organised. Figure 3 presents the number of entities in the listed group according to the principal consolidation application type. The graph indicates that the 90th percentile of the number of entities in the groups that principally use spreadsheets is 69 entities, while the similar figure for GL/EPR and specialised consolidation applications types are 132 and 444 respectively.

Figure 3: Decentralisation by Consolidation Application Type
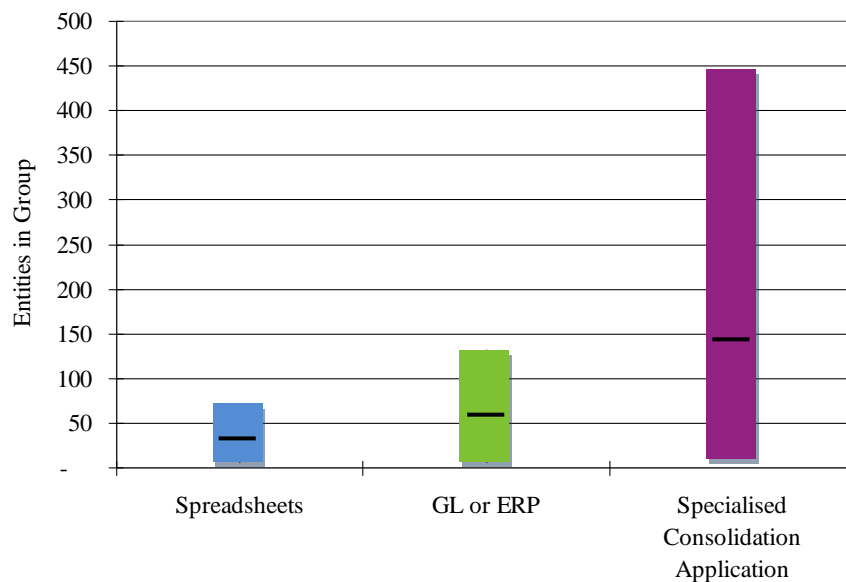
It should again be noted that Figure 3 must neither be interpreted that decentralised groups make exclusive use of specialised consolidation applications, nor that more centralised groups always make use of either spreadsheets or GL/ERP's during the consolidation process. For example, one participant that uses a collection of spreadsheets to perform the consolidation, completed the process successfully and in a comparitavely short period of time, despite having 250 entities in the group. The questionnaire completed on behalf of Co X Ltd stated that approximately 103 entities are included in the consolidation, which places the company in the 89th percentile in terms of decentralisation. In other words, approximately 11% of participating companies contained more entities in the listed group than Co X Ltd.

When interviewees were asked whether they considered the consolidation application to be appropriate for the company's needs, the question was answered by referring to the complexity of the group, in other words, the number of entities contained in, and the geographic spread of the group. Remarkably, not one interviewee explained the choice of consolidation application in terms of the turnover of the company.

3. Consolidation System Characteristics

While it is certainly interesting to observe the clear trends that exist in the type of consolidation applications that are preferred by companies of certain turnover and extent of decentralisation, such statistics do not shed any light on the actual manner in which the different types of consolidation systems are used. For example, it could be that even though specialised consolidation applications are capable of automatically eliminating the on-acquisition share capital of a subsidiary, such applications are not used to their full potential, resulting in the need to manually pass such consolidation adjustment entries. Three consolidation system characteristic scores or scales were developed on the basis of a number of questions that were included in the questionnaire: Sophistication; Integration; and Formalisation.

285

Amongst other questions, the questionnaire included a number of statements relating to specific aspects of the consolidation system. Participants were required to indicate whether they strongly disagreed; disagreed; were neutral or did not know; agreed; or strongly agreed with each of these statements. The sophistication, integration and formalisation scores were calculated by combining the responses that were provided to the relevant statements. It is important to point out that the responses to these statements were based on the perception of participants. The possibility does therefore exist that the participant's perception of the consolidation system could differ from reality, but it is anticipated that this variance should not materially impact on the research results.

3.1 Sophistication

Sophistication refers to the extent to which the consolidation system *automates* a number of functions that are integral to the year-end consolidation process, such as the elimination of inter group transactions; the calculation of the values that are contained in the consolidated group cash flow statement; and the translation at the appropriate exchange rate of values that are presented in a foreign currency. The maximum score that could be obtained for sophistication was 30, indicating a very sophisticated consolidation application. The consolidation system sophistication score obtained by Co X Ltd was **12**.

The coloured bars in Figure 4 represent the 10th to the 90th percentile of the sophistication scores obtained by listed companies that made use of the different types of consolidation system, while the lines on the bars indicate the average score. The first point that should be noted is that a significant variation exists in the sophistication scores obtained by companies that make use of the different types of consolidation systems. In other words, despite the potential of specialised consolidation applications to obtain a high score on the sophistication scale, many companies that use such applications achieved a lower sophistication score than companies that exclusively use spreadsheets during the consolidation process. However, it is evident that many companies use the available functionality of specialised consolidation applications to render such systems more

286

sophisticated than spreadsheets. It is also clear that specialised consolidation applications generally scored higher on the sophistication score than the other two groups of consolidation applications.
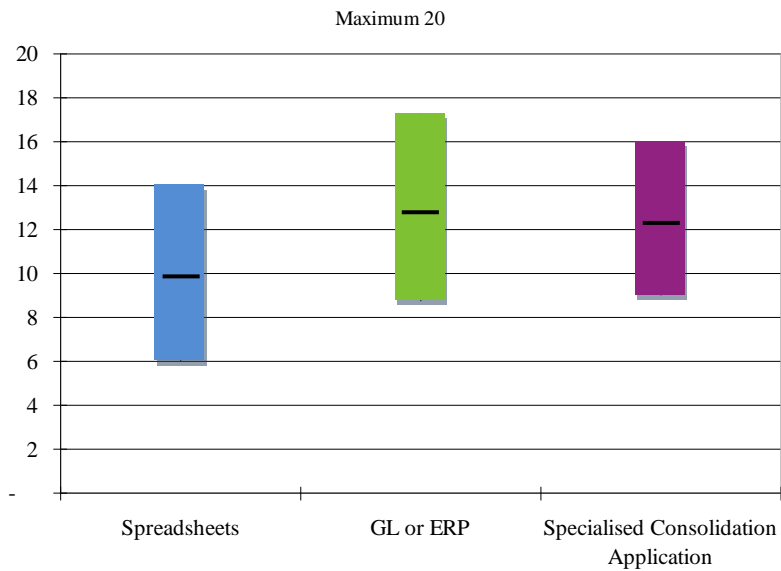
Figure 4: Sophistication by Consolidation Application Type

Maximum 30
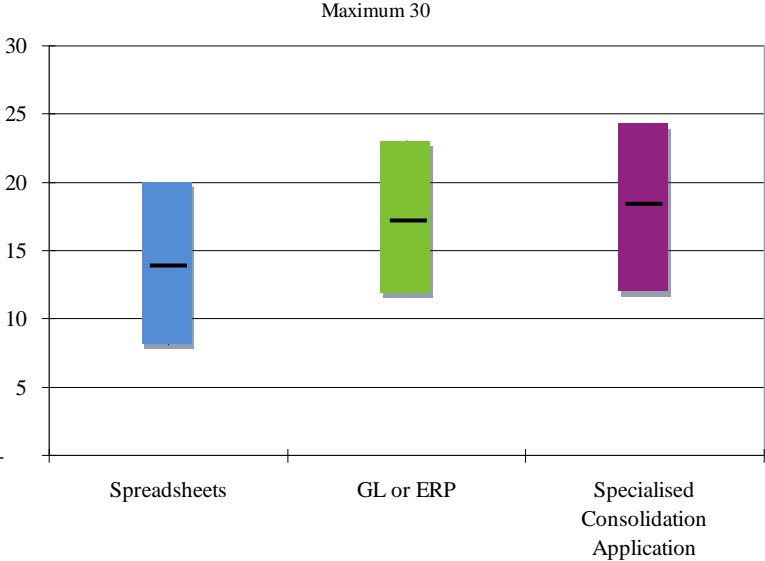
3.2 Integration

Integration refers to the amount of automated data transfer between the sources of the consolidation data (such as the GLs or the packs submitted by subsidiaries) and the consolidation application, and also the extent of automated data transfer from the consolidation application into reports (both management reports and the annual financial statements). The maximum integration score that could be obtained was 20, indicating a very integrated consolidation application where very little data is manually entered into the system and also that the reports are automatically populated with the consolidated data. The consolidation system integration score obtained by Co X Ltd was **18**.

Figure 5: Integration by Consolidation Application Type

Maximum 20

It is clear from Figure 5 that, despite the large variations in scores obtained, companies that use specialised consolidation applications are generally more integrated than their counterparts that use spreadsheets during the consolidation process. However, consolidation modules that form part of a GL/ERP system are used as the most integrated type of consolidation system. This trend could be expected since the consolidation module is an integral part of the GL/ERP and as a result, manual entering of data into the consolidation application should be limited. The integration of the consolidation system is important because it reduces the need for the menial re-entering of data and also because it diminishes the likelihood of errors taking place during the data transfer process due to human mistakes. Improved system efficiencies are particularly relevant in the South African context in the light of the acute skills shortage of qualified accountants.

3.3 Formalisation

The formalisation score attempted to gauge the level of internal controls that operate within the consolidation system and in its environment. Included in the formalisation

score are issues such as the control that exists over access to the consolidation system and how changes to the consolidation system are managed. The maximum formalisation score that could be obtained was 25. The consolidation system integration score obtained by Co X Ltd was **23**.

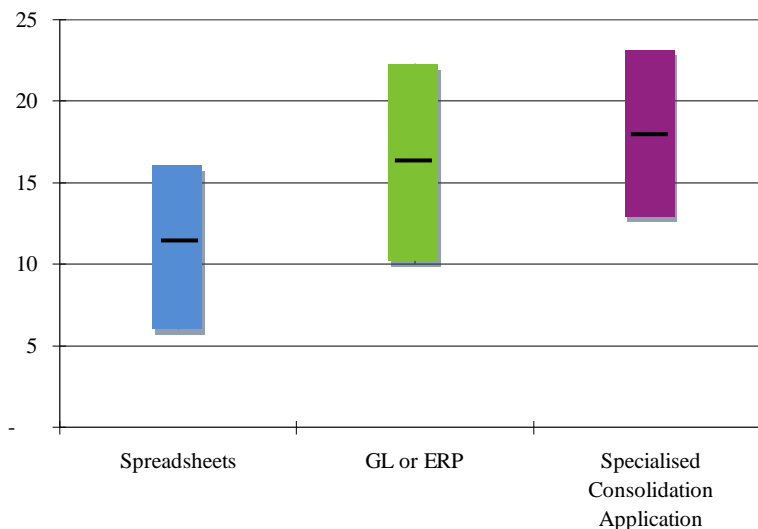**Figure 6: Formalisation by Consolidation Application Type**

Figure 6 clearly demonstrates that spreadsheets are generally used in a more informal manner, where, for example, changes to the system are made without proper controls. GL/ERP type applications appear to be used in a more formalised manner when compared to spreadsheets, but specialised consolidation applications are generally used in the most formalised environment. A very clear theme that emerged from the detailed interviews with group accountants was that while the need for some level of internal controls is appreciated, the general sentiment regarding system formalisation is that it is often an 'over kill' and causes the consolidation process to be unnecessarily delayed. However, contrary to the perception that the formalisation of the consolidation system causes delays, empirical evidence clearly indicates that companies with a greater relative level of consolidation system formalisation are able to complete the consolidation phase of the year end process more rapidly and are also able to publish their financial information on SENS before other companies with a similar number of entities in the
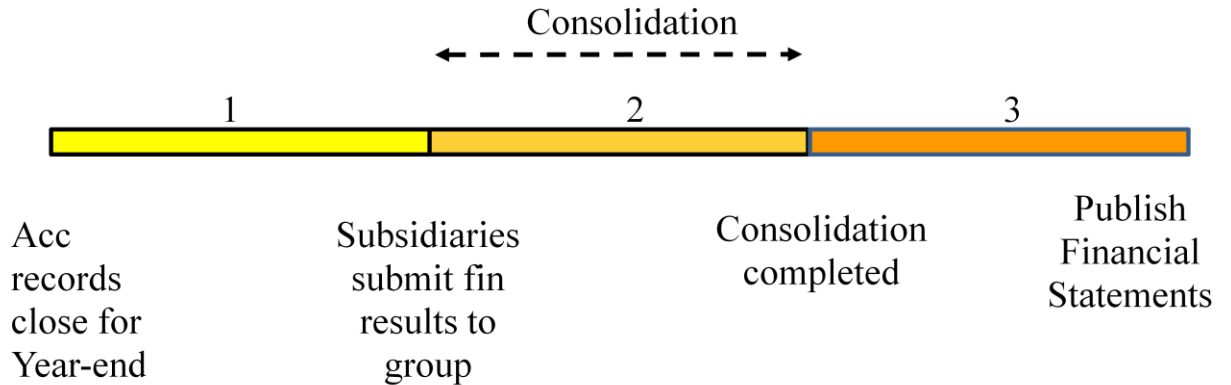
listed group. It also emerged from the research that certain companies, where consolidation system formalisation is highly valued, consciously decided to reduce the consolidation system's sophistication by manually performing certain functions that the system is capable of automating. The manual completion of such functions provides these companies with a greater level of control over the consolidation process, thereby enhancing the level of system formalisation.

4. Close Period

There is a general perception among interviewees that, all else being equal, the consolidation of more complex groups will necessarily take longer than the consolidation of a less complex group. It is worth mentioning that interviewees did not indicate that the turnover of the group was the most important factor that influences the consolidation period. Naturally, interviewees knew how many days after year-end financial results were formally published for their company. However, somewhat unexpectedly, interviewees were also generally aware how long their peers took to publish financial results. In some industries, the publication date of the financial results of each company in the industry is agreed upon in advance.

For the purposes of this research project, the year-end period has been divided into three phases (refer to Figure 7). Phase 1 relates to the number of **working** days that entities within the group require to complete their own year-end processes, at the end of which the year-end packs are submitted for consolidation. Phase 2 relates to the number of **working** days that is used by the group accountants to perform the group consolidation. Phase 3 relates to the period after the consolidation has been completed but before the financial results have been published. The financial statements are drafted and approved during this final period.

Figure 7: Year-End Phases

Apart from asking research participants to specify how many **working** days each of these periods took to complete during the most recent year-end, the questionnaire also required participants to indicate how many hours were worked during the consolidation phase of the year-end process (phase 2). This information was then used to normalise/adjust the consolidation period to ensure comparability. Without such adjustments, consolidation periods would not have been comparable if, for example, the group accountants at one company worked 16 hours per day during the consolidation period, while the group accountants at another company worked a normal eight hour day.
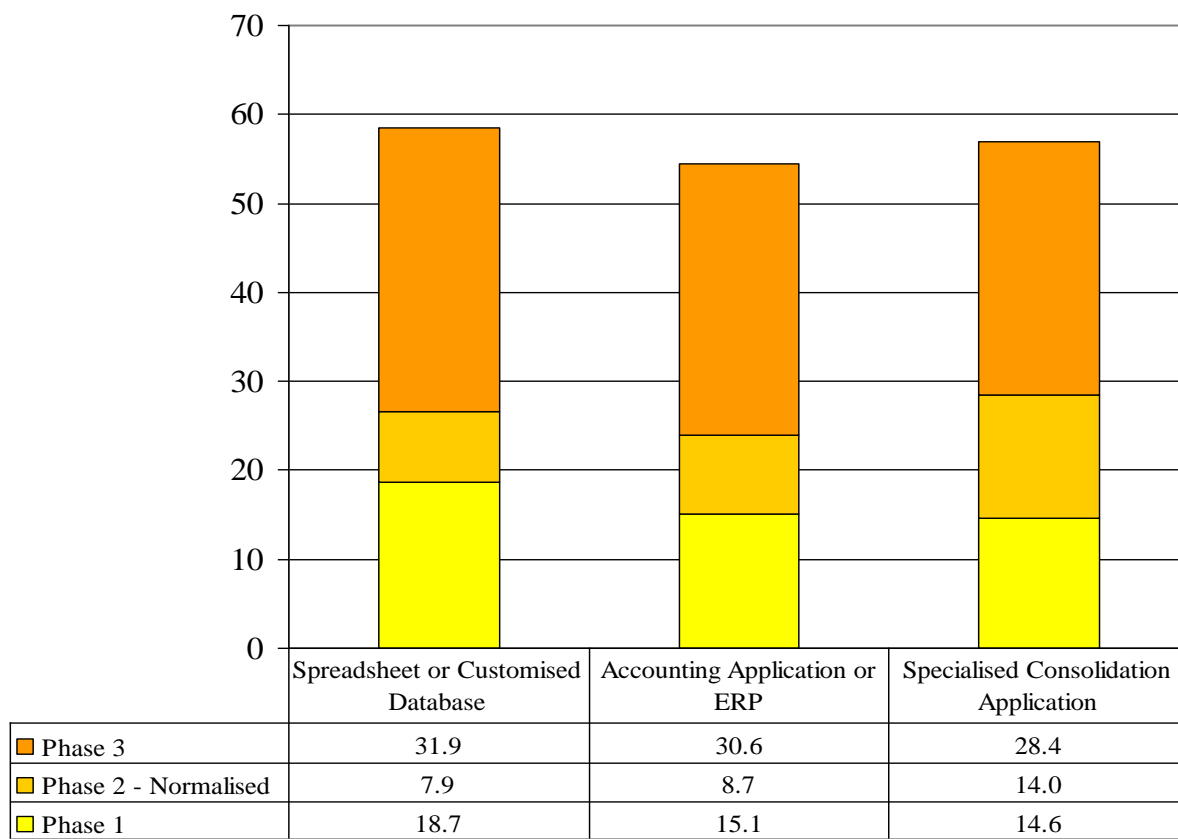
It can be observed from Figure 8 that companies that use spreadsheet consolidations allowed their subsidiaries the longest period of time (18.7 working days) to submit their packs to group (phase 1), while the companies that use specialised consolidation applications allow subsidiaries the least amount of time to submit their packs (14.6 working days). The questionnaire completed on behalf of Co X Ltd stated that subsidiaries were allowed 4 working days to submit their packs to group.

Companies that use spreadsheets were able, on average, to complete the consolidation in 7.9 adjusted working days, which is approximately half the period of time required by companies that use specialised consolidation applications (14 adjusted working days). However, it should be kept in mind that the groups of companies that use specialised consolidation applications generally contain many more entities when compared to groups of companies that use spreadsheet consolidations. Consolidations that contain a relatively large amount of entities are naturally more complex, which would necessarily take longer to complete.   The calculated adjusted working days to complete the consolidation for Co X Ltd were 1.6 working days.

The average number of days that were required to publish the financial statements after the consolidation (phase 3) had been completed was 31.9, 30.6 and 28.4 working days for spreadsheets, GL/ERP's and specialised consolidation applications respectively. The questionnaire completed on behalf of Co X Ltd stated that phase 3 of the year-end process was completed in 35 working days.

Groups of companies that use GL/ERP consolidation applications were, on average, able to complete the entire year-end process in the least number of working days (54.4 days) while groups of companies that use spreadsheets as a consolidation tool required the longest period of time (58.5 days). It is interesting to note that an analysis of the number of days that were required for the publication of the financial results on the JSE SENS system reveals exactly the same pattern when it was analysed according to the type of consolidation system used.

Figure 8: Year-End Phases by Consolidation Application Type (Working Days)

	Spreadsheet or Customised Database	Accounting Application or ERP	Specialised Consolidation Application
■ Phase 3	31.9	30.6	28.4
■ Phase 2 - Normalised	7.9	8.7	14.0
■ Phase 1	18.7	15.1	14.6

5. Conclusions

The choice of consolidation application is not straight forward, but some significant factors should be considered in the decision making process. The principal consideration in this process should be the number of entities that are contained in the group for which consolidated financial statements are prepared. Spreadsheets should be an adequate consolidation application for centralised groups, i.e. where the group consists of a small number of entities. Equally, spreadsheets are generally not the ideal consolidation tool for complex decentralised groups. In such cases, a specialised consolidation application or a consolidation module that forms part of the GL/ERP is more appropriate.

Affordability is another important consideration in the South African context. Generally, the use of a spreadsheet as the consolidation application has a zero marginal cost, since most companies would already have purchased the necessary license. When questioned regarding the choice of consolidation application, some interviewees noted that while another application might have been a closer match to the needs of the group, the cost of the ideal consolidation application was prohibitively expensive.

One other issue that should be considered in the process of deciding on the right consolidation application is the extent to which the same general ledger and/or chart of accounts is used by entities in the group. It is clear from the research that a consolidation module that forms part of the GL/ERP application is the most appropriate for those groups that generally have a consistent general ledger and/or chart of accounts throughout the group. In such cases, the cost of making use of the consolidation module in the GL/ERP is insignificant and the potential for and ease of integration is considerably enhanced.

Specialised consolidation applications and consolidation modules that form part of a GL/ERP are, on average, used in a more sophisticated, formalised and integrated manner when compared to spreadsheets. However, due to the huge variation in the manner in which consolidation systems are used, it was found that many companies that do make use of spreadsheets to consolidate the financial statements use them in a manner that is more sophisticated, formalised and integrated than other types of consolidation systems. Statistical analysis of the questionnaire data revealed that a relationship exists between the period that is required to complete the consolidation and the three characteristics of the consolidation system (formalisation; sophistication; and integration). It is also clear that many companies that do make use of GL/ERP consolidation modules or specialised consolidation applications fail to make use of the sophisticated features of these applications. In such circumstances, significant benefits could be derived if the system is enhanced in order to utilise some of these functionalities.

The choice of the most appropriate consolidation application is not clear-cut, but it is important to get right. Contrary to popular opinion, spreadsheets are often used in a sophisticated manner and are the most appropriate consolidation solution for centralised groups of companies. Evidence indicates that a consolidation application that is properly designed, installed and used, not only contributes towards the ability of a company to reduce the cost of the year-end process, but also to improve the control over the consolidation process.

Appendix F – Published Article

The following article was published in the March 2009 issue of the Accountancy SA (ASA) magazine as a cover feature.   Portions of the journal were scanned to demonstrate the prominence of the article in that issue of the journal.

contents

297

credits and contributors

this month's contributors

Paul van der Merwe says that enterprise architecture can help organisations identify and mitigate risk. It does so by modelling all of an organisation's processes, business and technology artefacts, and helping the organisation cope with change before it happens. As such, enterprise architecture represents the best and most holistic way to cope with the risk introduced by various initiatives, such as new regulatory compliance requirements.

Professor Ben Marx and Jan Dijkman say that recent corporate collapses, business failures and fraudulent financial reporting scandals not only gave rise to a credibility crisis for the auditing profession, but also the risk of a Big Four auditing firm domination of the audit market, and the possible effect that a collapse of one of these remaining firms poses to the effective functioning of the audit market.

Luis Gillman says that the concepts outlined in Network Activity Based Costing have wide applications for members who often battle to implement activity based costing systems in network industries including railways, trucking, telecommunications, couriers, airlines and post offices.

Pieter Smith says that the choice of the most appropriate consolidation system for a group of companies is not straight-forward, but it is important to get it right. His article presents evidence collected from 210 JSE listed companies to indicate what type of consolidation system is the most suitable in different circumstances.

Adel & Hermann du Plessis

Why the NEW GEN SUPPLEMENT?
Your career development and growth is your responsibility! You need to be adaptable to change and manage it accordingly. The underlying purpose of our articles is to develop your self-awareness and give you the tools to cultivate and master the skills and dimensions that are imperative to succeed as a moral business person. Our Four New Gen supplements for 2009 are aligned with the professional skills in the Core Experience Requirements of SAICA: interpersonal skills; communication skills; personal skills; and organisational and management skills.

On the cover

Cover image: courtesy of Getty Images.
This month's cover illustrates the idea around mitigating risk during the world economic recession.

The relatively high percentage of companies that relied exclusively on spreadsheets during the consolidation process was unexpected.

Accountants appear to regard the use of spreadsheets to consolidate the financial statements of listed companies as unusual and somewhat unsophisticated. It is also generally considered that companies, whether listed or unlisted, that use spreadsheets to perform the consolidation, are behind the times. This article will explore some of these sentiments and examine empirical evidence to demonstrate in which circumstances spreadsheets are appropriate and, conversely, when other types of solutions are more suitable as the principal consolidation application. This article is based on research in which self-completion questionnaires were distributed to the group accountants of JSE listed companies. 210 completed questionnaires were returned which yields a greater than 50% response rate, thus providing a representative sample of South African listed companies and consequently a reliable data set. The questionnaires were followed up by eight in depth interviews that provided a more detailed understanding of the design and use of consolidation systems as part of the consolidation process at JSE listed companies.

One point that emerged clearly from the research is that spreadsheets are used, almost universally, by accountants as an integral part of the process to prepare the consolidated financial statements of listed companies. However, the extent of reliance on spreadsheets during the consolidation process varies considerably. 62% of participants indicated that spreadsheets were the principal application which was used during the consolidation process. Consolidation modules that form an integral part of General ledger (GL) or ERP applications were used by 18% of participants, while 20% made use of specialised consolidation applications to consolidate the financial statements (Figure 1). However, even those companies who indicated that their principal consolidation application was either a GL/ERP, or a specialised consolidation application, also make widespread use of spreadsheets to complement their principal consolidation application. In such cases, spreadsheets facilitated a range of other consolidation functions such as the creation of management reports, reconciliation of inter-group transactions, the collection of additional disclosure information and the drafting of the annual financial statements. *See figure 1.*

The relatively high percentage of companies that relied exclusively on spreadsheets during the consolidation process was unexpected.

Consolidation systems in South Africa: horses for courses

This figure is particularly surprising when compared to the results of a 1996 survey of a sample of American companies, during which it emerged that merely 6% of respondents made exclusive use of spreadsheets to consolidate the financial statements, while 54% used specialist consolidation systems. The article, in which the results of the somewhat dated survey were published, unfortunately did not provide either any information regarding the size and the representativeness of the sample, or the profile of participating companies – such as the group turnover or the number of subsidiaries contained in the group. Consequently, it is difficult and possibly imprudent to make direct comparisons to or definite inferences from the results of the American survey. Nevertheless, it should be safe to conclude that the extent to which South African companies rely on spreadsheets during the consolidation process is greater than that of American companies.

However, empirical evidence suggests that valid reasons seem to exist for the widespread use of spreadsheets during the consolidation process. An analysis of the turnover of companies that use the three different groups of consolidation applications revealed a clear trend: Listed groups with a relatively small turnover tend to favour spreadsheets, while groups with relatively larger turnover use the consolidation module that forms part of the GL/ERP applications, and the groups with the largest reported turnover use specialised consolidation applications. Figure 2 presents the turnover of research participants according to the application type that was used during the consolidation process. The bars on the graph indicate the 10th to the 90th percentile range in reported group turnover, while the lines on the bars indicate the average. The graphs reveal that the 90th percentile of turnover for groups that use spreadsheets is R9.1 billion, while the turnover for GL/ EPR and specialised consolidation applications is R40.3 billion and R59.3 billion respectively. This apparent trend should neither be interpreted that listed companies with relatively large turnover make use of only specialised consolidation applications; nor that companies with relatively smaller turnover use spreadsheets exclusively. *See figure 2.*

25

Figure 1: Principal Consolidation Application

Figure 2: Group Turnover by Consolidation Application Type

Specialised Consolidation Application 20%

Spreadsheets 62%

GL or ERP 18%

Million ZAR

70 000
60 000
50 000
40 000
30 000
20 000
10 000

Spreadsheets   GL or ERP   Specialised Consolidation Application
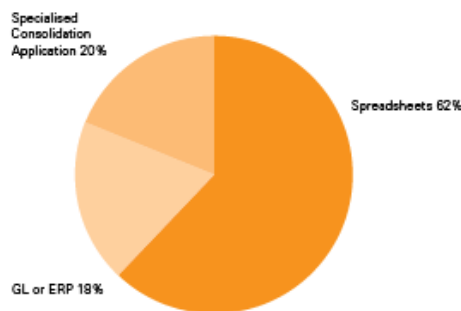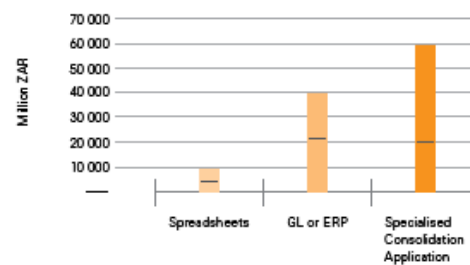
26

An even clearer trend emerges when the extent of decentralisation in listed groups is considered in terms of the type of consolidation applications that are used. Group decentralisation refers to the number of entities in which the listed group is organised. Figure 3 presents the number of entities in the listed group according to the principal consolidation application type. The graph indicates that the 90th percentile of the number of entities in the groups that principally use spreadsheets is 69 entities, while the similar figure for GL/EPR and specialised consolidation applications types are 132 and 444 respectively. *See figure 3.*

**Figure 3: Decentralisation by Consolidation Application Type**
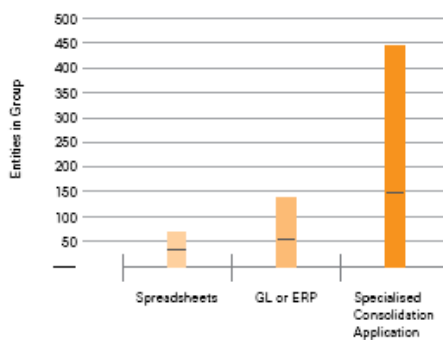
It should again be noted that Figure 3 must neither be interpreted that decentralised groups make exclusive use of specialised consolidation applications, nor that more centralised groups always make use of either spreadsheets or GL/ERPs during the consolidation process. For example, one participant that uses a collection of spreadsheets to perform the consolidation, completed the process successfully and in a comparatively short period of time, despite having 250 entities in the group.

While it is certainly interesting to observe the clear trends that exist in the type of consolidation applications that are preferred by companies of certain turnover and extent of decentralisation, such statistics do not shed any light on actual manner in which the different types of consolidation systems are used. For example, it could be that even though specialised consolidation applications are capable of automatically eliminating the on-acquisition share capital of a subsidiary, such applications are not used to their full potential, resulting in the need to manually pass such consolidation adjustment entries. Three consolidation system characteristic scores were developed on the basis of a number of questions that were included in the questionnaire completed by the group accountants: Sophistication; Integration; and Formalisation.

Sophistication refers to the extent to which the consolidation system automates a number of functions that are integral to a year-end consolidation process, such as the elimination of inter group transactions; the calculation of the values that are contained in the consolidated group cash flow statement; and the translation at the appropriate exchange rate of values that are presented in a foreign currency. The maximum score that could be obtained for sophistication was 45, indicating a very sophisticated consolidation application. *See Figure 4.*

Figure 4: Sophistication by Consolidation Application Type
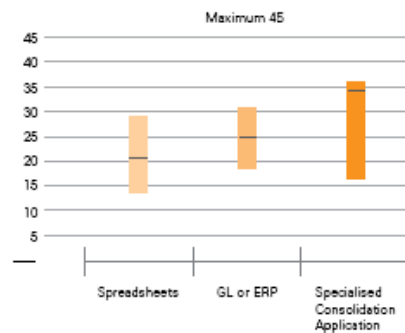
The coloured bars in Figure 4 represent the 10th to the 90th percentile of the sophistication scores obtained by listed companies that made use of the different types of consolidation system, while the lines on the bars indicate the average score. The first point that should be noted is that a significant variation exists in the sophistication scores obtained by companies that make use of the different types of consolidation systems. In other words, despite the potential of specialised consolidation applications to score high on the sophistication score, many companies that use such applications achieved a lower sophistication score than companies that exclusively use spreadsheets during the consolidation process. However, it is evident that many companies use the available functionality of specialised consolidation applications to render such systems more sophisticated than spreadsheets. It is also clear that specialised consolidation applications generally scored higher on the sophistication score than the other two groups of consolidation applications. *See Figure 5.*

Figure 5: Integration by Consolidation Application Type
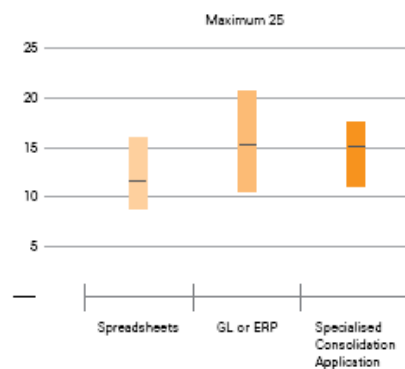
301

Integration refers to the amount of automated data transfer between the sources of the consolidation data (such as the GL or the packs submitted by subsidiaries) and the consolidation application, and also the extent of automated data transfer from the consolidation application into reports (both management reports and the annual financial statements). The maximum integration score that could be obtained was 25, indicating a very integrated consolidation application where very little data is manually entered into the system and also that the reports are automatically populated with the consolidated data. It is clear from Figure 5 that, despite the large variations in scores obtained, companies that use specialised consolidation applications are generally more integrated than their counterparts that use spreadsheets during the consolidation process. However, consolidation modules that form part of a GL/ERP system are used as the most integrated type of consolidation system. This trend could be expected, since the consolidation module is an integral part of the GL/ERP and as a result, manual entering of data into the consolidation application should be limited. The integration of the consolidation system is important because it reduces the need for the menial re-entering of data and also because it diminishes the likelihood of errors taking place during the data transfer process due to human mistakes. Improved system efficiencies are particularly relevant in the South African context in the light of the acute skills shortage of qualified accountants. *See Figure 6.*

Figure 6: Formalisation by Consolidation Application Type
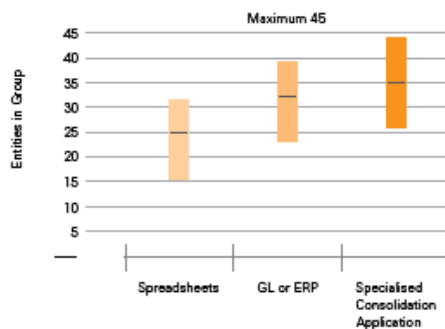
The formalisation score attempted to gauge the level of internal controls that operate within the consolidation system and in its environment. Included in the formalisation score are issues such as the control that exists over access to the consolidation system and how changes to the consolidation system are managed. The maximum formalisation score that could be obtained was 45. Figure 6 clearly demonstrates that spreadsheets are generally used in a more informal manner, where, for example, changes to the system are made without proper controls. GL/ERP type applications appear to be used in a more formalised manner when compared to spreadsheets, but specialised consolidation applications are generally used in the most formalised environment. A very clear theme that emerged from the detailed interviews with group accountants is that while the need for some level of internal controls is appreciated, the general sentiment regarding

system formalisation is that it is often an 'overkill' and causes the consolidation process to be unnecessarily delayed. However, contrary to the perception that the formalisation of the consolidation system causes delays, empirical evidence clearly indicates that companies with a greater relative level of consolidation system formalisation are able to complete the consolidation phase of the year-end process more rapidly and are also able to publish their financial information on SENS before other companies with a similar number of entities in the listed group. It also emerged from the research that certain companies, where consolidation system formalisation is highly valued, consciously decided to reduce the consolidation system's sophistication by manually performing certain functions that the system is capable of automating. The manual completion of such functions provides these companies with a greater level of control over the consolidation process, thereby enhancing the level of system formalisation.

Choosing the Right Horse
The choice of consolidation application is not straight forward, but some significant factors should be considered in the decision making process. The principal consideration in this process should be the number of entities that are contained in the group for which consolidated financial statements are prepared. Spreadsheets should be an adequate consolidation application for centralised groups, i.e. where the group consists of a small number of entities. Equally, spreadsheets are generally not the ideal consolidation tool for complex decentralised groups. In such cases, a specialised consolidation application or a consolidation module that forms part of the GL/ERP is more appropriate.

Affordability is another important consideration in the South African context. Generally, the use of a spreadsheet as the consolidation application has a zero marginal cost, since most companies would already have purchased the necessary license. When questioned regarding the choice of consolidation application, many interviewees noted that while another application might have been a closer match to the needs of the group, the cost of the ideal consolidation application was prohibitively expensive.

One other issue that should be considered in the process of deciding on the right consolidation application, is the extent to which the same general ledger and/or chart of accounts is used by entities in the group. It is clear from the research that a consolidation module that forms part of the GL/ERP application is the most appropriate for those groups that generally have a consistent general ledger and/or chart of accounts throughout the group. In such cases, the cost of making use of the consolidation module in the GL/ERP is insignificant and the potential for and ease of integration is considerably enhanced.

The choice of the most appropriate consolidation application is not clear-cut, but it is important to get it right. Contrary to popular opinion, spreadsheets are often used in a sophisticated manner and are commonly the most appropriate consolidation solution for centralised groups of companies. Evidence indicates that a consolidation application that is properly designed, installed and used, not only contributes towards the ability of a company to reduce the cost of the year-end process, but also to improve the control over the consolidation process. asa

Pieter Smith CA(SA), MBA, is an independent financial consultant and a doctoral student at Durham University (UK).

27

302

Appendix G – Public Lecture Information

SAICA
THE SOUTH AFRICAN INSTITUTE OF CHARTERED ACCOUNTANTS

develop. influence. lead.

SEMINARS AND WORKSHOPS | **Topic: Consolidation Systems: An SA Perspective**

Seminar

Topic: Consolidation Systems: A South African Perspective

The SAICA CFO forum has the pleasure of inviting you to its first event of the year. It remains the objective of The CFO Forum, powered by Deloitte, to provide a platform for the sharing of best practice, networking opportunities, bridging the gap between academic thought leadership and its practical applications.

To kick start the 2009 series of CFO forum events, Pieter Smith CA(SA), a consolidation systems specialist, will present his doctoral research findings on Consolidation Systems: A South African Perspective. Underpinning the successful execution of any CFO role is good quality systems and processes. However the task of choosing the right system is often a daunting challenge. Pieter Smith will provide insight on the efficient use of the right system for your business. The SAICA CFO forum, cordially invites you to join us for a cocktail after the event. Attendance is free of charge and SAICA members will obtain verifiable CPD credits.

Seminar overview
Research was conducted in order to investigate certain aspects of the consolidation systems used by JSE listed companies. The results of the research do not only shed light on the manner in which JSE listed companies use their consolidation systems, but also provide definite suggestions on how these systems could be designed in order to increase the reliability of the financial results and reduce the amount of resources allocated to the year-end process. The analysis of the data revealed interesting and surprising results, particularly in relation to the use of spreadsheets during the consolidation process. The research was performed to fulfill part of the requirements of a doctorate degree. The data was collected by means of detailed interviews and 210 questionnaires that were completed by the group accountants of JSE listed companies

What topics the seminar will cover

- What proportion of JSE listed companies use spreadsheets to perform the consolidation?
- How are consolidation systems used to complete the consolidation rapidly?
- Which consolidation systems are used by JSE listed companies?
- Does it help to employ more group accountants if you want to achieve a fast close at year-end?

Who should attend?
All CFOs, CEOs, Group Accountants, Controllers, Financial Managers and other Finance Executives

Seminar duration
15:30 - 16:00 Registration and refreshments
16:00 - 18:00 Workshop
18:00 - Cocktails

Date
Wednesday, 1 April 2009

Venue
Southern Sun Grayston

About the presenter
Pieter Smith qualified as a Chartered Accountant in 1999. After qualification, he moved to the UK where he consulted in the design and implementation of various accounting systems. He obtained his MBA at the University of Stirling in 2005. Pieter enrolled for a doctorate degree at Durham University in 2006.

After returning to South Africa in 2007, he specialised in the design and implementation of consolidation systems. It is anticipated that the final doctoral thesis will be submitted for evaluation in June 2009.

Continuing Professional Development

This presentation will account for 2 hour verifiable CPD. Please record your CPD hours on the CPD system accessible via the SAICA website http://www.saica.co.za.

How to enrol

Either **register electronically** for this event or e-mail the following details to **paulettew@saica.co.za** or fax 011 621 6762:

- Delegate's title, initials, first name, surname, ID Number or SAICA membership/trainee number.
- Name of organisation to be invoiced, tel no, fax no, e-mail address and postal address.
- Date and venue of the presentation.

Please note that telephonic reservations and enrolments are not accepted.

Contact details
Telephone: 08610 SAICA or 08610 724 22
Fax: 011 621 6762
E-mail: **paulettew@saica.co.za**
Website : **www.saica.co.za**

Appendix H – Data Analysis Tables

Table H1:   Maximum likelihood regression weight estimates for the Measurement Model

			Estimate	S.E.	C.R.	P
Interco Trans	←	Sophistication	1.000			
Automated Ctrl	←	Sophistication	2.258	0.514	4.394	***
Access Control	←	Formalisation	1.000			
Appl Control	←	Formalisation	0.719	0.143	5.018	***
Int Input	←	Integration	1.000			
Int Output	←	Integration	0.948	0.147	6.459	***
S1	←	Interco Trans	1.000			
S2	←	Interco Trans	0.987	0.071	13.971	***
S5	←	Interco Trans	0.588	0.067	8.755	***
S3	←	Automated Ctrl	1.000			
S4	←	Automated Ctrl	0.586	0.091	6.426	***
S8	←	Automated Ctrl	0.488	0.083	5.918	***
F1	←	Access Control	1.000			
F5	←	Access Control	0.926	0.097	9.553	***
F9	←	Access Control	0.882	0.098	8.980	***
F2	←	Appl Control	1.000			
F3	←	Appl Control	0.714	0.112	6.388	***
I1	←	Int Input	1.000			
I3	←	Int Input	0.356	0.108	3.291	0.001
I2	←	Int Output	1.000			
I4	←	Int Output	0.682	0.127	5.363	***

*** - parameter estimate significantly different from zero using a significance level α = 0.001

Table H2:   Estimated covariances for the Measurement Model

			Estimate	S.E.	C.R.	P
Sophistication	↔	Formalisation	0.380	0.101	3.776	***
Sophistication	↔	Integration	0.257	0.076	3.389	***
Formalisation	↔	Integration	0.507	0.118	4.305	***

*** - parameter estimate significantly different from zero using a significance level $\alpha = 0.001$

Table H3:   Estimated variances for the Measurement Model

	Estimate	S.E.	C.R.	P
Sophistication	0.270	0.095	2.833	.005
Formalisation	1.016	0.268	3.788	***
Integration	0.892	0.208	4.289	***
e1	0.968	0.138	7.010	***
e2	0.088	0.291	0.303	0.762
e3	0.166	0.175	0.947	0.344
e4	1.046	0.256	4.091	***
e5	0.050			
e6	0.050			
es1	0.176	0.073	2.406	0.016
es2	0.338	0.077	4.407	***
es5	0.892	0.091	9.751	***
es3	0.637	0.172	3.713	***
es4	1.264	0.140	9.016	***
es8	1.118	0.120	9.284	***
ef1	1.080	0.142	7.619	***
ef5	0.584	0.093	6.284	***
ef9	0.742	0.099	7.457	***
ef2	0.422	0.225	1.873	0.061
ef3	0.766	0.135	5.655	***
ei1	1.098	0.169	6.502	***
ei3	1.339	0.136	9.819	***
ei2	0.821	0.143	5.748	***
ei4	1.083	0.128	8.435	***

*** - parameter estimate significantly different from zero using a significance level $\alpha = 0.001$

Table H4: Estimated squared multiple correlations for the Measurement Model

Variable	Estimate	Variable	Estimate
Int Output	0.941	F1	0.523
Int Input	0.947	F5	0.635
Appl Control	0.334	F9	0.554
Access Control	0.860	F2	0.788
Automated Ctrl	0.940	F3	0.511
Interco Trans	0.218	I1	0.462
S1	0.876	I2	0.509
S2	0.781	I3	0.082
S5	0.324	I4	0.268
S3	0.697		
S4	0.285		
S8	0.238		

Table H5: **Modification** **indices** **for** **additional** **covariances** **in** **the** **Measurement Model**

			M.I.	Par Change
ef1	↔	e4	5.658	0.231
ef5	↔	e4	4.450	-0.161
es1	↔	Integration	4.412	-0.097
es1	↔	e5	5.320	-0.121
es1	↔	ei3	7.157	-0.139
es2	↔	e5	5.361	0.130
es2	↔	ei3	5.415	0.130
es2	↔	es3	4.035	-0.105
es5	↔	Integration	4.243	0.143
es5	↔	ei4	4.766	0.160

Table H6: **Modification indices for additional regression weights in the Measurement Model**

			M.I.	Par Change
I4	←	Formalisation	4.118	0.174
I4	←	Access Control	4.181	0.157
I4	←	F9	4.069	0.119
I4	←	S3	4.300	0.109
F1	←	F2	4.399	0.118
F1	←	S4	4.144	0.122
S1	←	I3	8.793	-0.109
S2	←	I3	5.981	0.097
S5	←	I4	5.676	0.131

Table H7:   Estimated variances for the Structural Equation Model

	Estimate	S.E.	C.R.	P
Sophistication	.260	.094	2.777	**
Formalisation	.957	.230	4.162	***
Integration	.899	.208	4.321	***
Decentralisation	1.486	.150	9.890	***
e5	.050			
e6	.050			
e1	.981	.136	7.238	***
e2	.019	.295	.064	.949
e3	.244	.150	1.626	.104
e4	.953	.221	4.318	***
e9	.050			
es5	.892	.092	9.747	***
es2	.340	.076	4.501	***
es1	.174	.072	2.416	**
es8	1.113	.120	9.309	***
es4	1.258	.139	9.033	***
es3	.658	.168	3.916	***
ef9	.741	.099	7.497	***
ef5	.601	.091	6.576	***
ef1	1.062	.137	7.751	***
ef3	.734	.129	5.671	***
ef2	.482	.201	2.395	**
ei3	1.327	.136	9.797	***
ei1	1.092	.168	6.515	***
ei4	1.080	.125	8.653	***
ei2	.844	.137	6.165	***
e8	1.347	.140	9.635	***

*** - parameter estimate significantly different from zero using a significance level α = 0.001

** - parameter estimate significantly different from zero using a significance level α = 0.05

Table H8: **Estimated squared multiple correlations for the Structural Equation Model**

	Estimate
Int Output	.940
Int Input	.947
Appl Control	.369
Access Control	.797
Automated Ctrl	.987
Interco Trans	.209
LXX	.967
LY2	.210
I2	.495
I4	.270
I1	.465
I3	.090
F2	.758
F3	.531
F1	.531
F5	.624
F9	.554
S3	.687
S4	.289
S8	.242
S1	.877
S2	.780
S5	.324