A Literature Review on the Impact of Enterprise Systems on Management Accounting

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Abstract

This paper provides a comprehensive review of previous research at the interface of enterprise systems (i.e. enterprise resource planning (ERP), business intelligence (BI) systems) and management accounting. To date, research has focused mainly on ERP systems with the exception of one study which also investigated BI systems. Studies are reviewed under three categories: those that have employed a positivist approach, an interpretivist approach, and a combination of both approaches. The findings of the literature review suggest that the majority of previous empirical studies has tended to focus on describing changes in management accounting practice and in the role of the management accountant resulting from ERP implementations rather than focusing on analyzing and understanding these changes. The paper presents a research agenda which aims to help academics and practitioners achieve a better understanding of the impact that enterprise systems may have on management accounting.

Keywords: enterprise systems, enterprise resource planning, business intelligence, management accounting, management accountant, literature review
1. Introduction

In light of recent dramatic changes in the corporate world, namely globalisation and severe competition, the contribution of management accounting to business control and planning has increased considerably. Recent advancements in the corporate use of information technology (IT), commonly known as enterprise systems (ES), appear to have the potential to enhance this contribution (see, for example, Nicolaou, 2008; Kallunki et al., 2011). The term ES is widely used in the literature (see, for example, Davenport, 1998, 2000; Shang and Seddon, 2002; Brown and Vessey, 2003; Davenport et al., 2004; Moller, 2005; Alvarez, 2008; Schubert and William, 2009), and refers to business information systems that are implemented in order to integrate information flow across the entire organisation. Enterprise resource planning (ERP) systems, the primary ES form (Sutton, 2006), succeeded manufacturing resource planning (MRPII) systems in the mid-1990s. In comparison to their predecessors, ERP systems are expanded both functionally and technologically (David et al., 1999; Olhager and Selldin, 2003). While MRPII systems were designed for materials management and production planning purposes, ERP systems are, according to Sadagopan (2003), capable of addressing the needs of several additional business functions such as finance, cost, sales, quality management, plant maintenance, service management, and human resources. To attain integration between the abovementioned functional areas, ERP systems exploit a centralised database which collects and stores data within the organisation in real-time.

Although ERP systems are generally designed and introduced by non-accountants, they are closely connected with the accounting processes (Chapman, 2005). As indicated by Sadagopan (2003), some of the most ordinary accounting processes, which are incorporated in an ERP system, include: general ledger, accounts receivable, accounts payable, financial control, asset management, funds flow, cost centers, profit centers, profitability analysis, order and project accounting, product cost accounting, and performance analysis. Accordingly, ERP systems should have implications for all areas of accounting (Hunton, 2002; Sutton, 2006).

The deployment of ERP systems generally results in significant reductions in the routine tasks of management accountants (Lowe, 2004; Arnold and Sutton, 2007; Drury, 2008) and the subsequent a transition in their role from one of information gatherer or transaction-orientated role, to one of information analyst or business-orientated role (Granlund and Lukka, 1998; Hunton, 2002) or more simply from the back office to the front office (Holtzman, 2004). Furthermore, management accounting practices, whether traditional or modern, may become more efficient and effective when supported with ERP systems (see, for example, Edwards, 2001; Baxendale and Jama, 2003; Lea and Min, 2003; Scapens and Jazayeri, 2003; He, 2007; Lea, 2007). This is possible through greater information integration, greater flexibility in information access, and superior functionality (Booth et al., 2000). More recently, the enrichment of ERP systems with new ES, such as business intelligence (BI) systems, appears to have had a significant boost to the role of management accounting. BI systems normally sit on top of ERP systems, and are intended to bridge transactional efficiency with strategic planning (see figure 1). BI comprise a set of tools used for data analysis, query and reporting (Elbashir et al., 2008) and supporting strategic decision-making (Fahy, 2001; Bucher et al., 2009; Mikroyannidis and Theodoulidis, 2010) by providing managers with insights into their business
BI systems are composed of three complementary and interrelated tools, namely data warehousing, online analytical processing (OLAP), and data mining. As Teorey et al. (2006) describe, data warehousing deals with the storage, maintenance and retrieval of historical data; OLAP provides quick answers to ad hoc queries; and data mining is a collection of algorithms which find patterns in the data and return valuable user information.

Since the early 2000s, the interaction between ES and management accounting has constituted a research topic of particular interest, and there is a growing body of literature in this area. The first and extensive detailed works in this line of research surfaced as a consequence of the large scale adoption of ERP systems (see, for example, Booth et al., 2000; Granlund and Malmi, 2002; Caglio, 2003; Hyvonen, 2003; Scapens and Jazayeri, 2003). To date, researchers have shown interest in ERP systems, with the exception of Rom and Rohde (2006) who have also paid attention to BI systems.

Despite the fact that considerable research has been devoted to the impact that ERP systems have upon both management accounting practice and role of the management accountant, no clear conclusions on these issues can be drawn. This is due to the fact that, up to now, most research has tended to focus on describing changes in management accounting resulting from ERP implementations rather than focus on analyzing and understanding them. In other words, whilst researchers have indicated how ERP systems may have an impact on management accounting practice and on the management accountant’s role, they have largely neglected to consider the explanatory variables of these impacts. These variables exert influence...
on the extent of change in management accounting practice and in the management accountant’s role resulting from ERP implementations. More specifically, looking into the extant relevant empirical findings, there are a number of companies which have experienced minor changes in management accounting post ERP implementations, several which have experienced moderate changes, and a small number which have experienced significant changes. Yet, no research has attempted to provide a sufficient explanation of why such differences among ERP adopting firms with regard to these changes exist.

As a result, Sutton (2006) argues that the extant empirical findings have been a poor guide to those interested in ES and management accounting. At the same time, it is increasingly important to understand the impact of ES on management accounting (Sutton, 2000, 2005, 2006; Granlund and Mouritsen, 2003; Rom and Rohde, 2006, 2007; Granlund, 2011) for the following two reasons. Firstly, such systems appear to have the potential to facilitate practitioners’ endeavors to advance management accounting practice in order to improve control and planning within their businesses; thus, practitioners need to know whether and how these systems can meet expectations. Secondly, such systems drive semantic changes in the occupational identity of management accountants; thus, they need to know what skills they should add to their portfolio in order to respond to the demands of their new roles, and, in the long run, remain indispensable in their businesses.

The present study addresses the above issues and has the following objectives:

- To provide a comprehensive review of previous empirical research within the area of ES and management accounting in order to obtain an initial understanding of this area; and
- To identify gaps in the literature and give directions for future research in order to help academics and practitioners to achieve a better understanding of the relationship between ES and management accounting.

The remainder of this paper is structured as follows. In the next section the search approach adopted to undertake the literature review is outlined. This is followed with a review of previous empirical research at the interface of ES and management accounting. The next section summarises and discusses the findings of the literature review. Finally, some concluding remarks and areas of further research are outlined in the concluding section.

2. Literature Search

In order to carry out a comprehensive literature search, the following search strategy was adopted for the period 1995 to 2011.

- Review of academic databases (ABI/Inform Global; Business Source Premier; Emerald; Informaworld; Ingentaconnect; ScienceDirect; Social Science Research Network, and Swetswise);
- Review of the accounting journals listed in Harvey et al. (2010);
- Review of the information systems journals listed in Harvey et al. (2010); and

The review of academic databases (ABI/Inform Global; Business Source Premier; Emerald; Informaworld; Ingentaconnect; ScienceDirect; Social Science Research Network, and Swetswise) was undertaken using a combination of keywords (e.g. “enterprise resource planning” and “accounting” / “accountant”; “ERP system” and “accounting” / “accountant”; “business intelligence” and “accounting” / “accountant”). All articles retrieved as a result of this search were subject to further analysis by reviewing the title, abstract and keywords to ascertain their applicability for inclusion in the literature review. The full text of all articles retrieved from the detailed search of the accounting and information system journals reviewed by Harvey et al. (2010) and the accounting information systems journals were subject to examination in order to identify their appropriateness for inclusion.

3. Literature Review

To date, a number of empirical studies have investigated the relationship between ES and management accounting. Using methodological criteria, these studies can generally be grouped into three categories: those which have employed a positivist approach, an interpretivist approach, and a combination of both approaches. The differences between the two research paradigms (i.e. positivism and interpretivism) lie in the selection of the research method (Weber, 2004). Positivist researchers usually carry out surveys or experiments, while interpretivist researchers typically conduct case studies. On the basis of the above three categories, a review of the literature is now conducted.

3.1. Empirical Studies Employing a Positivist Approach

Table 1 provides a summary of previous research within the area of ES and management accounting which has adopted a positivist paradigm. A review of these studies indicates that the survey method has been used extensively.
Table 1 Empirical research within the area of ES and management accounting which has employed a positivist approach

<table>
<thead>
<tr>
<th>Year</th>
<th>Author</th>
<th>Country</th>
<th>Type of survey</th>
<th>Sample (usable responses)</th>
<th>Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Booth et al.</td>
<td>Australia</td>
<td>Postal</td>
<td>55 firms</td>
<td>Chief financial officers</td>
</tr>
<tr>
<td>2003</td>
<td>Hyvonen</td>
<td>Finland</td>
<td>Postal</td>
<td>86 firms</td>
<td>Accounting personnel, Chief financial officers</td>
</tr>
<tr>
<td>2003</td>
<td>Spathis &amp; Constantinides</td>
<td>Greece</td>
<td>Postal, fax, e-mail</td>
<td>45 firms</td>
<td>Accounting personnel, Accounting information systems personnel, Administration, Information technology personnel</td>
</tr>
<tr>
<td>2004</td>
<td>Doran &amp; Walsh</td>
<td>Ireland</td>
<td>Postal</td>
<td>68 firms</td>
<td>Financial controllers</td>
</tr>
<tr>
<td>2004</td>
<td>Spathis &amp; Constantinides</td>
<td>Greece</td>
<td>Postal</td>
<td>26 firms</td>
<td>Information department staff</td>
</tr>
<tr>
<td>2005</td>
<td>Spathis &amp; Ananiadis</td>
<td>Greece</td>
<td>–</td>
<td>1 University, 43 employees</td>
<td>ERP users from the accounting and other financial departments</td>
</tr>
<tr>
<td>2005</td>
<td>Spraakman</td>
<td>Canada</td>
<td>Postal, telephone</td>
<td>28 firms</td>
<td>Business controllers</td>
</tr>
<tr>
<td>2006</td>
<td>Jackling &amp; Spraakman</td>
<td>Australia</td>
<td>Postal, web, telephone</td>
<td>35 firms</td>
<td>Chief financial officers</td>
</tr>
<tr>
<td>2006</td>
<td>Rom &amp; Rohde</td>
<td>Denmark</td>
<td>–</td>
<td>349 firms</td>
<td>Chief financial officers</td>
</tr>
<tr>
<td>2006</td>
<td>Spathis</td>
<td>Greece</td>
<td>Postal, fax, e-mail</td>
<td>73 firms</td>
<td>Accounting personnel, Accounting information systems personnel, Administration, Information technology personnel</td>
</tr>
<tr>
<td>2009</td>
<td>Jean-Baptiste</td>
<td>–</td>
<td>E-mail</td>
<td>212 IMA members/Certified Public Accountants</td>
<td>Management accountants</td>
</tr>
<tr>
<td>2009</td>
<td>Sangster et al.</td>
<td>U.K.</td>
<td>Postal</td>
<td>62 CIMA members</td>
<td>Management accountants</td>
</tr>
</tbody>
</table>

– : not acknowledged; IMA: Institute of Management Accountants; CIMA: Chartered Institute of Management Accountants
At this point, it is useful to note that the majority of surveys have been designed to examine the impact of ERP systems on management accounting practice. In this context, some studies have focused on identifying changes only with regard to the transactional aspects of management accounting (e.g. changes in information processing), while other studies have also paid attention to the strategic aspect of management accounting by viewing ERP systems as enablers of sophisticated accounting techniques (e.g. activity based costing (ABC), benchmarking, balanced scorecard (BSC)). Some research has also been conducted which has explored the interaction between the ERP system and the management accountant.

Booth et al.’s (2000) study represents the first systematic attempt to examine the impact of ERP systems on management accounting practice. The study attempted to assess whether organisations with ERP systems experience higher levels of information integration, improvements in terms of reporting and decision-making, and a greater use of sophisticated accounting techniques. Using a survey which was distributed to the top 800 companies in Australia, seventy four responses were received (giving a 9.3% response rate). However, since the authors wanted to compare ERP and non-ERP users, any company who had an ERP project under consideration or an ERP implementation in progress was excluded from the analysis. The final sample therefore consisted of 55 firms, representing 32 non-ERP and 23 ERP users. Booth et al.’s findings indicated that ERP systems are effective in supporting information processing but less so for reporting and decision-making support. Rather surprisingly, there was no noteworthy difference between ERP and non-ERP users regarding the level of information integration with a possible explanation being that most ERP implementations were at an early stage of development. Since ERP systems often need years to ‘bed in’ (Adhikari et al., 2004), the majority of benefits are expected to be extracted from these systems when they are in their maturity phase. Booth et al. (2000) also indicated that ERP systems have a minor impact on the adoption of sophisticated accounting techniques. In particular, no statistically significant difference in the utilisation of such techniques between ERP and non-ERP users was determined. For this reason, Booth et al. (2000) deduced that ERP systems do not constitute an incentive for the adoption of sophisticated accounting techniques.

In a similar vein, Hyvonen (2003) conducted a comparison between ERP and best of breed (BoB) systems in respect of their impact on management accounting practice. BoB systems are stand-alone applications designed to support a single or small number of functional areas rather than the entire organisation (Engle, 2008). As illustrated by Rom and Rohde (2006), BoB systems are normally installed to assist practitioners in dealing with activities such as consolidation, budgeting, costing and performance measurement. A questionnaire was distributed to 300 large and medium-sized businesses in Finland with 99 responses received (response rate of 33%). Their findings indicate that ERP systems were used by 53% of the respondents, while the remainder used BoB systems. Based on 86 usable responses (13 enterprises which had not updated their information systems during the 1990s were excluded from the final sample), Hyvonen (2003) argued that ERP and BoB systems exert almost the same influence on management accounting practice, as no statistically significant differences between these information systems were found. Explicitly, both had a small impact on the introduction of sophisticated accounting techniques. However, it is worth noting that in most cases where such techniques
were adopted, companies had an ERP system. Furthermore, Hyvonen (2003) reports that BoB systems surpass ERP systems in terms of solving management accounting problems related to budgeting, cost control and flexibility, accuracy and reliability of reporting activities. In summary, the findings of this study corroborate earlier evidence provided by Booth et al. (2000) that ERP systems are not sufficient in terms of reporting and do not motivate the utilisation of sophisticated accounting techniques.

Spathis and Constantinides (2003) also explore how ERP systems have influenced the management of accounting information. Using telephone contacts from a random sample of 98 large and medium-sized Greek companies, the researchers report on the practices of 45 organisations (response rate of 45.9%). The most highly rated ERP perceived accounting benefits found by the researchers were increased flexibility in information generation, improved quality of reports and increased integration of applications. No significant improvements were experienced by the surveyed firms with regard to the time required for issuing reports and the decision-making process. The findings of Spathis and Constantinides (2003) are therefore much in line with those of Booth et al. (2000) which suggested that ERP systems are effective in supporting information processing, but not as effective in terms of reporting and decision-making support.

One year later, Doran and Walsh (2004) reported the results of a survey which was designed to examine the impact that ERP systems have upon both management accounting practice and the role of the management accountant. Using a survey, Doran and Walsh (2004) received 70 responses from Irish companies (representing a response rate of 45.8%). In comparison with the findings of Booth et al. (2000) and Hyvonen (2003), Doran and Walsh (2004) found a stronger relationship between ERP systems and management accounting. In particular, while the former indicated that ERP implementations are not significantly associated with the adoption of sophisticated accounting techniques, the latter revealed that several companies utilised such techniques alongside ERP systems. The findings also suggest that ERP systems increase the use of numerous traditional management accounting practices, (e.g. variance analysis, standard costing, marginal costing, breakeven analysis). Finally, the findings suggest that ERP systems advance the role of the management accountant. For example, following the implementation of ERP systems, more comprehensive information is automatically provided to managers which consequently free the management accountant from manual tasks and facilitate more time for information analysis to support key decision makers.

In a similar fashion, Spathis and Constantinides (2004) attempted to identify what changes to management accounting practice have come about as a result of ERP implementations. Extending their earlier study which investigated the impact that ERP systems have on the management of accounting information, they examined whether ERP implementations in the Greek business context are associated with the adoption of sophisticated accounting techniques. Again using a random sample of telephone contacts of 98 large and medium-sized companies, Spathis and Constantinides (2004) report on 26 companies which participated in the study (response rate of 26.5%). The findings of this study are in line with those of Doran and Walsh (2004) and suggest that after the implementation of ERP systems, sophisticated accounting techniques, such as ABC and target costing are
implemented. Furthermore, the evidence provided by Spathis and Constantinides (2004) adds support to the results of the studies of Booth et al. (2000) and Spathis and Constantinides (2003), indicating that ERP systems are more effective in terms of information processing (e.g. increased flexibility in information generation) and less effective in terms of reporting and decision-making.

Another study by Spathis and Ananiadis (2005) investigated how the implementation of an ERP system influenced the management of accounting information, thereby replicating that of Spathis and Constantinides (2003). What differentiates these two studies is that Spathis and Constantinides (2003) conducted a survey of 45 firms, whereas Spathis and Ananiadis (2005) carried out a survey of ERP users in the context of a single case study, namely a large Greek public university. The researchers used structured questionnaires in two phases to collect data, one month before and one year after the implementation of the ERP system. Questionnaires were sent to a random sample of 61 ERP users (University staff), of whom 43 participated in the survey, giving a 70.5% response rate. The most highly rated ERP perceived accounting benefits were improved follow-up of assets, increased flexibility in information provision, improved cash control, and less time required for end of year procedures. Improved quality of reports and less time for issuing reports were among the lowest rated benefits of the ERP system. These findings suggest that ERP systems support tasks of information processing better than reporting activities, and, therefore, reinforce the findings of Booth et al. (2000) and Spathis and Constantinides (2003, 2004).

In the same year, research by Spraakman (2005) examined how ERP systems changed management accounting practice and in particular capital budgeting activities. The survey was administered to 71 large Canadian companies with 35 responses received (response rate of 43.7%). With respect to capital budgeting, the changes occurred were noted as follows: more rigorous use of detailed and accurate data (e.g. organisation of data by type and start date), more realistic process, on-line submissions, reviews and approvals of data used in capital budgeting, increased linkages to strategy, greater ability to track projects such as construction plan, monetary expenditures and fixed asset ledgers and decentralisation of smaller projects. Furthermore, Spraakman (2005) indicates that ERP systems have a moderate impact on other management accounting practices, such as budgeting, operating statements, forecasting, performance measurement and costing. Some of the most frequent changes regarding these practices, which were observed after the implementation of ERP systems, were:

- **Budgeting**: more automated, more detailed, more accurate, easier to use, easier for consolidations, and improved overview capacity.
- **Operating statements**: more automated, more detailed and quicker generation.
- **Forecasting**: longer term, more frequent, rolling and not merely fixed period, more accurate, more integrated, and more detailed.
- **Performance measurement**: expanded, more detailed, more focused on operations, more flexible reports, greater use of benchmarking.
- **Costing**: more detailed, more focused, more accurate, more flexible reports.

Overall, it can be concluded from Spraakman’s (2005) findings that ERP implementations mainly improve the use of existing traditional management
accounting practices rather than enabling the use of sophisticated accounting techniques.

The research of Spraakman (2005) was replicated by Jackling and Spraakman (2006) in an Australian context. Using a questionnaire which was distributed to 90 large companies, 35 responses were received (response rate of 38.9%). The most significant changes in capital budgeting arising from the implementation of ERP systems were increased use of analytical or measurement tools, such as risk adjustments, return on investment, weighted average cost of capital, discounted cash flow, internal rate of return and payback; and increased formalisation and rigour in the overall process, principally expressed through the development of an investment management committee. With respect to the impact of ERP systems on other management accounting practices, such as costing, performance measurement, forecasting, operating statements and budgeting, Spraakman (2005) find that ERP systems render these practices to be more detailed, accurate and flexible.

In later work, Rom and Rohde (2006) attempted to trace the differences between ERP systems and BI systems with respect to their impact on management accounting practice. A questionnaire was sent to 3,000 Danish large and medium-sized firms and 401 responses were received (response rate of 13.4%), of which 349 were suitable for analysis. The authors indicate that ERP systems are effective in terms of collecting data and organising management accounting tasks. These systems also support and improve the use of some traditional management accounting practices. These findings are largely consistent with those of Spraakman (2005) and Jackling and Spraakman (2006). Rom and Rhode (2006) also report that ERP systems are not significantly associated with improvements in information reporting and analysis, confirming earlier studies. As for BI systems, the research findings show that they further improve data collection and facilitate and advance reporting, analysis and budgeting tasks. However, a limitation of this particular study is that the authors did not investigate whether any sophisticated accounting techniques were utilized post-BI implementation. Nevertheless, based on their findings, the researchers inferred that BI systems seem to be able to support such techniques. Rom and Rohde (2006) also argued that there is an independent variable called “sophistication of management” which is likely to affect the extent of change in management accounting due to ES implementations. According to the authors, this variable is concerned with the extent to which management focuses on and applies appropriate management techniques and should influence both the comprehensiveness of ES and management accounting.

In the same year, research conducted by Spathis (2006) examined what accounting benefits were achieved via ERP implementations. Spathis’s (2006) study attempted to identify the independent variables which affect the number of perceived accounting benefits from using ERP systems. Drawing on the responses of 73 Greek large and medium-sized organizations, Spathis (2006) reports the most highly rated accounting benefits, deriving from the implementation of ERP systems, as follows: increased flexibility in information generation, increased integration of applications, improved quality of reports, quicker issuing of reports, improved decisions based on timely and reliable accounting information, and speedier end of year accounting procedures. In comparison with earlier studies, the study found a significant relationship between ERP systems, reporting and decision-making. Nevertheless, Spathis (2006) also
indicates that ERP systems support tasks of information processing better than reporting and decision-making activities. Interestingly, Spathis (2006) also measured the correlation between the number of ERP perceived accounting benefits and a number of independent variables: number of implemented ERP modules, number of reasons for ERP implementation, cost of ERP implementation (as a percentage of sales) and company size (total assets). He found that there is a positive correlation between the independent variables (with the exception of the cost of ERP implementation) and the number of accounting benefits. Conversely, a negative correlation was found between the cost of ERP implementation and the number of accounting benefits. The most influential independent variable found in the study was the number of implemented ERP modules.

In a more recent study, Jean-Baptiste (2009) evaluated the contribution of management accountants to the deployment of ERP systems. The research methodology adopted included the distribution of a questionnaire in 2005 to approximately 50,000 members of the Institute of Management Accountants (IMA). Three years later, the same survey was also sent to 45 certified public accountants outside of the IMA group. The questionnaire was completed only by management accountants with ERP experience. In total, 219 responses were received, of which 212 were suitable for analysis. The researcher reports the existence of a significant positive relationship between the participation of management accountants in an ERP implementation and its level of success. Jean-Baptiste (2009) also found that when management accountants are equipped with high IT skills, they are more likely to become members of ERP groups in both the implementation and maintenance phases of ERP systems. The author also stresses that during the implementation of an ERP system, management accountants need enhanced financial, knowledge sharing and IT skills. These same skills are also required in the post implementation phase. Interestingly, report writing abilities were found to be an additional skill required by management accountants after the implementation of an ERP system. This finding seems to corroborate evidence provided by earlier research that ERP systems are not sufficient in terms of information reporting and decision-making. As a consequence, management accountants are often forced to develop additional reports via the use of spreadsheets in order to present relevant information to decision makers.

In the most recent study to adopt a positive perspective, Sangster et al. (2009) examined the relationship between ERP systems and management accounting, paying particular attention to the impact these systems have upon the role of the management accountant. The ultimate objective of this study was to detect whether there is a relationship between the level of success of ERP implementations and the extent of change in the role of the management accountant. Sangster et al.’s (2009) survey instrument was designed by drawing heavily on the research of Grabski et al. (2009) and other related literature. Grabski et al (2009) found that the more successful an ERP implementation is, the more significant the changes which take place in the role of the management accountant. Sangster et al.’s sample consisted of 668 members of the Chartered Institute of Management Accountants (CIMA) who were employed in large UK organisations. Ninety two questionnaires were completed, representing a 13.8% response rate. Of these, only 62 were used for analysis, representing management accountants who were employed for an ERP adopting organisation. The findings of Sangster et al.’s study suggest that the level
of success of an ERP implementation is not significantly related to the extent of change in management accounting practice, as successfully implemented ERP systems merely automate data collection and improve information quality. This finding strengthens the results of prior research which indicated that ERP systems are effective mainly in terms of information processing. Sangster et al. (2009) also report that there is a significant correlation between the level of success of an ERP implementation and the extent of change in the role of the management accountant. Explicitly, they observed that successfully implemented ERP systems result in dramatic changes in the work of management accountants, as many of their previous tasks (e.g. information gathering and provision) are executed by the ERP system. As a consequence, management accountants can concentrate on value-adding activities such as information analysis. Conversely, they indicate that poorly implemented ERP systems limit the role of management accountants, since the latter continue to carry out the same tasks but in a more complex work setting. The authors also considered the skills which are required by management accountants when they work in ERP adopting firms. Their findings suggest that the key skills which management accountants should possess in this context include IT competencies, cross functional working relationships and analytical and consulting abilities, which concur with the findings of Jean-Baptiste (2009).

3.2. Summary of Positivist Empirical Research

A number of conclusions can be drawn from the above review. First, ERP systems appear to be associated with transaction-oriented changes in management accounting. There is strong evidence that after the implementation of an ERP system, accounting information is not only more comprehensive and reliable, but is also generated and provided to decision makers more flexibly. As a result, management accountants are free from routine tasks such as information gathering and provision, hence saving time to concentrate on value-adding activities in order to support decision-making. In particular, tasks such as information reporting and analysis, which cannot effectively be carried out by the ERP system, may be added to the tasks of the management accountant. Post ERP implementation, management accountants may also deal with the management of the ERP system. A second conclusion is that ERP systems appear to be weak in driving strategic-oriented changes in management accounting practices. More precisely, ERP systems tend to reinforce the use of traditional management accounting practices such as variance analysis, standard costing, marginal costing, and breakeven analysis, rather than enabling the use of sophisticated accounting techniques. Despite this, there is some limited evidence that techniques such as ABC, target costing, BSC and benchmarking have been introduced post ERP implementation. The above review of positivist studies has provided an understanding of the changes that may be driven in management accounting post ERP implementation. However, more research is needed to understand under what conditions these changes take place. In other words, which independent variables affect the impact that ERP systems have on management accounting practices? Two potential independent variables, namely use of a BI system as ERP superstructure and level of sophistication of management have been identified through the above review. Rom and Rohde (2006) assume that ERP systems when combined with BI systems are enablers of significant changes in management accounting, such as improvements in the way management accounting
tasks are performed and greater adoption of sophisticated accounting techniques. This assumption seems logical, since a BI system is implemented as an ERP extension in order to provide management with enhanced analytical abilities (Elbashir et al., 2008). Furthermore, Rom and Rohde (2006) characterise the extent to which management focuses on and applies sophisticated accounting techniques as an independent variable, which may influence the extent of change in management accounting due to ERP systems. This independent variable also seems relevant, as the decisions of managers around the ERP system are critical to the type and magnitude of the benefits that can be extracted from the system (Staehr, 2010).

3.3. Empirical Studies Employing an Interpretivist Approach

In addition to the studies reviewed in the previous section, a number of researchers have employed an interpretivist perspective to investigate the interplay between ES and management accounting practices and the role of the management accountant. These are summarised in Table 2. In one of the earliest of these studies, Granlund and Malmi (2002) explored the impact that ERP systems have on management accounting practice and the role of the management accountant. Drawing on extended interviews with ten large Finish companies, Granlund and Malmi (2002) report that ERP systems have little impact on management accounting practices and that some techniques, such as ABC and BSC, used in the organizations investigated were not supported by the ERP system. With respect to the role of the management accountant, Granlund and Malmi (2002) find that ERP systems have reduced the amount of routine work related to transaction handling towards more analytical value-added activities related to managerial control and decision-making.

In later research, Caglio (2003) reported the findings of a case study which investigated the impact of ERP systems on the role of the management accountant. Drawing on in-depth interviews with practitioners who were intimately involved in the implementation of the ERP system at Pharmacon, an Italian medium-sized pharmaceutical firm, and documentary evidence, Caglio (2003) find that the chief financial officer (CFO), played an influential role in decisions around the implementation of the ERP system. The ERP system enabled widespread changes to take place to the management accountant’s role with the ERP system playing a major role in information gathering and generating information. As a consequence, management accountants have lost some control over their traditional tasks and are now more focused on analyzing the information coming out of the ERP system in terms of supporting the decision-making process.
### Table 2: Empirical research within the area of ES and management accounting which has employed an interpretivist approach

<table>
<thead>
<tr>
<th>Year</th>
<th>Author</th>
<th>Country</th>
<th>No. of cases</th>
<th>No. of interviews</th>
<th>Duration of interviews</th>
<th>Interviewees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>Granlund &amp; Malmi</td>
<td>Finland</td>
<td>10</td>
<td>16</td>
<td>≈ 1-2½h (each)</td>
<td>Chief financial officers, Controllers, Information technology managers, Project managers</td>
</tr>
<tr>
<td>2003</td>
<td>Caglio</td>
<td>Italy</td>
<td>1</td>
<td>–</td>
<td>&gt; 33h (in total)</td>
<td>Accounting personnel, ERP users, Information technology personnel, Management</td>
</tr>
<tr>
<td>2003</td>
<td>Scapens &amp; Jazayeri</td>
<td>U.K.</td>
<td>1</td>
<td>–</td>
<td>≈ 1½h (each)</td>
<td>Accounting and non-accounting personnel</td>
</tr>
<tr>
<td>2005</td>
<td>Dechow &amp; Mouritsen</td>
<td>Denmark</td>
<td>2</td>
<td>34</td>
<td>–</td>
<td>Accounting personnel, ERP users</td>
</tr>
<tr>
<td>2005</td>
<td>Quattrone &amp; Hopper</td>
<td>U.K., Japan, Belgium, U.S.A.</td>
<td>2</td>
<td>36</td>
<td>≥ 1½h (each)</td>
<td>ERP project managers</td>
</tr>
<tr>
<td>2006</td>
<td>Rikhardsson &amp; Kraemmergaard</td>
<td>Denmark</td>
<td>6</td>
<td>–</td>
<td>–</td>
<td>Chief financial officers, Chief information officers, Chief production managers</td>
</tr>
<tr>
<td>2006</td>
<td>Sayed</td>
<td>Egypt</td>
<td>1</td>
<td>23</td>
<td>≈ 1-3h (each)</td>
<td>Accounting personnel, Chief information officer, ERP implementers, Senior financial officer</td>
</tr>
<tr>
<td>2007</td>
<td>Granlund</td>
<td>–</td>
<td>–</td>
<td>21</td>
<td>–</td>
<td>Chief financial officers, Chief information officers, Controllers, Management</td>
</tr>
<tr>
<td>2007</td>
<td>Kholeif et al.</td>
<td>Egypt</td>
<td>1</td>
<td>–</td>
<td>&gt; 2h (each)</td>
<td>Accounting personnel, Information technology personnel, Management</td>
</tr>
<tr>
<td>2008</td>
<td>Jack &amp; Kholeif</td>
<td>Egypt</td>
<td>1</td>
<td>–</td>
<td>&gt; 2h (each)</td>
<td>Financial controller, Management accountants, Management</td>
</tr>
<tr>
<td>2008</td>
<td>O’Mahoney &amp; Doran</td>
<td>–</td>
<td>1</td>
<td>≥ 5</td>
<td>–</td>
<td>Management accountants</td>
</tr>
<tr>
<td>2009</td>
<td>Colmenares</td>
<td>Venezuela</td>
<td>1</td>
<td>≥ 6</td>
<td>&gt; 2h (each)</td>
<td>Senior managers</td>
</tr>
<tr>
<td>2009</td>
<td>Grabski et al.</td>
<td>U.K.</td>
<td>7</td>
<td>≥ 12</td>
<td>–</td>
<td>Management accountants, Management consultants, Information technology managers, Senior Managers</td>
</tr>
</tbody>
</table>

– : not acknowledged
In the same year, Scapens and Jazayeri (2003) investigated how the implementation of an ERP system changed management accounting practice as well as the role of management accountants in a large US-based manufacturer of building materials, referred to as BM by the researchers. Interviews were conducted with practitioners involved in the implementation phase of the ERP system and with employees most affected by its deployment. Scapens and Jazayeri (2003) observe that the ERP system had a moderate impact on management accounting practice. Specifically, it increased information visibility, thus making accounting information more readily available to decision-makers. It also enabled BM to carry out more frequent and efficient forecasts, and improved the conditions under which standard costing and actual costing were performed (e.g. input automation). In contrast, the ERP system was unable to provide all the reports required by BM’s management, and, as a consequence, spreadsheets were often used by management accountants to organise and report the information produced by the ERP system. The impact of the ERP system on the role of management accountants was important, as a number of positive changes in the tasks of these professionals are reported by the researchers. Most of the routine tasks of management accountants are now completed by the ERP system or non-accountants, and management accountants are now more concerned with interpreting the information generated by the ERP system. This change in emphasis has, however, resulted in the loss of some traditional skills. These findings largely confirm those reported by Granlund and Malmi (2002) and Caglio (2003).

In later work, Dechow and Mouritsen (2005) analysed how two large Danish multinational manufacturing firms attempted to improve management control by adopting an ERP system. In both firms, the researchers observed that post ERP implementation, the financial statements were generated more frequently, were more complete and reliable due to the automated and continuous data reconciliation afforded by the ERP system. One of the two firms tried to utilise benchmarking techniques in the ERP environment. However, the ERP system could not effectively support the measurement of divisional performance. Additionally, management accounting data could not be properly collected and aggregated due to the complexity of the ERP system. This finding is in line with that of Granlund and Malmi (2002) that ERP systems do not effectively support the utilisation of sophisticated accounting techniques because of the complexity of their architecture. This led Dechow and Mouritsen (2005) to conclude that the accounting benefits achieved via the deployment of the ERP system were limited to the consolidation of data.

Quattrone and Hopper (2005) also investigated how two large multinational manufacturing organizations attempted to improve management control by adopting an ERP system. Managers who were closely involved in the ERP implementation were interviewed and relevant documentation was analyzed. The findings of the case studies show that ERP systems increase information visibility. Prior to ERP implementation, management accountants were responsible for gathering and providing information to managers. Post implementation, the ERP system carries out these tasks. The researchers also indicate that post ERP implementation, tasks, which were formerly performed by management accountants (e.g. books of subsidiaries), are now performed by non-accountants through the ERP system. Quattrone and Hopper (2005) also report that post ERP implementation, management accountants wanted to utilize benchmarking techniques. However, this
was impossible due to the complexity of the ERP system. With respect to management accounting practice, the ERP system merely automated information processing confirming the findings of earlier studies (Granlund and Malmi, 2002; Scapens and Jazayeri, 2003; Dechow and Mouritsen, 2005).

In a later study, Sayed (2006) investigated the impact of ERP systems on the role of management accountants in a large Egyptian manufacturing company. Drawing on interviews with key practitioners, Sayed (2006) report that the lack of qualified IT specialists during the implementation phase of the ERP system affected its functionality which in turn affected the way the system was used. For example, a senior accountant within the company commented that accounting personnel relied on the help menu in order to understand how to perform their tasks in the new environment. Additionally, during the ERP implementation, there was a high level of antagonism between the accounting and production personnel regarding control of the system. The factory manager wanted to have control over the ERP system in order to improve production control while the accountant function argued that the ERP system should be under the control of the accounting department as financial statements are the final output of the system. To overcome this disagreement, the firm’s management accountants attempted, and, eventually, succeeded in adapting the ERP system to meet the needs of both the production and accounting staff. Sayed’s (2006) findings demonstrate that due to the lack of personnel equipped with appropriate IT skills, management accountants were required to enhance their technological expertise, and, in the long run, to represent themselves as experts in extracting the benefits from the ERP system. The author concludes that in a business environment, where some routine accounting tasks are accomplished by the ERP system and others are carried out by non-accounting staff, management accountants should redefine themselves and acquire new skills (e.g. communication skills, teamwork skills, IT skills, strategic thinking) so that they remain indispensable.

Using a similar methodology to that of Granlund and Malmi (2002), Rikhardsson and Kraemmergaard (2006) explored the organisational effects of ERP implementations in five large Danish manufacturing companies and the municipality of Copenhagen. Drawing on interviews and case descriptions which were written by those interviewed, the findings of the study suggest that ERP systems promote better coordination of processes. Specifically, they automated information processing, and, in the long run, reduced the need for manual inputs by management accountants. Prior to ERP implementation, management accountants were the ‘gate keepers’ of accounting information and were responsible for gathering and providing this information to decision makers. Post ERP implementation, accounting information is more freely available to managers. In order to support decision-making, management accountants now perform value-adding tasks, such as information analysis, scenario building and information assurance and presentation.

In a later piece of work, Granlund (2007) investigated the impact that ERP systems have on management accounting practice. Emerging from a comprehensive review of the related literature, the researcher performed a number of interviews with specialists operating in the relevant field. Interviews were supported with additional sources of information such as informal discussions with key practitioners and written material (e.g. software product descriptions). Granlund (2007) find that ERP systems are effective in supporting information processing and, as a result, change to some
extent the tasks of management accountants. To remain indispensable in their businesses, management accountants carry out new tasks, such as analysis of information produced by the ERP system, information system design, software implementation and maintenance of the ERP system. Furthermore, ERP systems were not able to support effectively the utilization of sophisticated accounting techniques because of the complexity of their architecture. As one interviewee described, his organization had attempted to develop ABC into the ERP system for two years, but the company finally abandoned the project because substantial amounts of time and money were required whilst the outcome was uncertain. Granlund (2007) argues that the changes in the structure of ERP systems, which have to take place for the support of sophisticated accounting techniques, may cause serious problems in business processes such as managerial reporting.

In the same year, Kholeif et al. (2007) investigated the failure of an ERP project in an Egyptian company, called AML. Interviews, site visits, and documentary evidence were used to collect data. Since AML is a state-owned enterprise, they had applied the Uniform Accounting System introduced in 1966 by the Egyptian control authorities for preparation of the National Plan. In terms of this system, “accounts are classified in homogeneous classes in a manner that assists in preparing national accounts, as well as satisfying the needs of the traditional financial and cost accounting” (Kholeif et al., 2007, p.9). In order to modernize its information systems, AML decided to invest in an ERP system. The ERP system was customized to be compliant with the Uniform Accounting System. However, it was not possible achieve complete conformity with the existing organisational system. Two of those interviewed characterized the ERP system as a highly complex information system which could not be adapted to the specific needs of the organization. As a result, neither management accounting practices or the role of management accountants changed as a result of the ERP implementation.

In later research, Jack and Kholeif (2008) examined the effects of a failed ERP implementation on the role of management accountants in an Egyptian company, IMC. The company was in charge of a programme sponsored by the European Union (EU) which aimed to promote the economic transition of Egypt from a central planning to a market oriented economy. To overcome the constraints of their existing system, IMC decided to implement an ERP system with the finance and distribution modules initially installed. Under the EU order, a controller and an IT manager at IMC undertook to build a web-based custom system for managing the budget. The system was designed to trace requisitions and contracts and automatically adjust budget lines using the intranet. Both practitioners left IMC before completing the development of the new system. As a consequence, the interaction between the web-based custom system and the ERP system was poor because of the low level of integration between the two systems. This issue was addressed by customizing the ERP system so it was in alignment with the needs of the organization. However, this resulted in the development of a conventional accounting information system. As a result, Jack and Kholeif (2008) found the neither management accounting practices or the role of management accountants changed as a result of the ERP systems.

O’ Mahony and Doran (2008), in later research, appraised the impact of an ERP implementation on the role of management accountants in a large multinational manufacturing company. The researchers conducted interviews with five
management accountants, a senior budget analyst, a senior financial analyst, a senior manufacturing analyst, a budget analyst and an accounting analyst. Similar to earlier research, they report that the ERP system enabled the management accountants to be relieved to a large extent from information processing activities and become more focused on information analysis to support decision-making. O’ Mahony and Doran (2008) also attempted to assess whether ERP systems provide an accounting role to non-accountants. Similar to earlier studies (Scapens and Jazayeri, 2003; Quattrone and Hopper, 2005; Sayed, 2006), the researchers found that traditional accounting tasks, such as reporting and journal bookings, are now performed by non-accountants.

Replicating Spathis and Constantinides’s (2003) study, Colmenares (2009) examined how the implementation of an ERP system influenced the management of accounting information in a large Venezuelan firm. Colmenares’s (2009) findings concur with those of Spathis and Constantinides (2003) which suggest that ERP systems facilitate the integration of accounting applications, increase the flexibility of information generation, improve the quality of financial reports and aid decision makers through provision of timely and reliable accounting information.

In the most recent interpretivist research, Grabski et al. (2009) investigated the relationship between ERP systems and management accountants in seven large UK organizations. The main objective of their research was to ascertain whether there is an association between the level of success of ERP implementations and the extent of change in the role of management accountants. The case study organizations comprised those who had experienced successful and unsuccessful ERP implementations. A number of findings were reported. First, the more successful an ERP implementation, the more considerable the changes that take place to the role of the management accountant. For example, in a successful ERP environment, management accountants focus on information analysis and interpretation in order to aid decision-making. Secondly, the participation of management accountants in the implementation of an ERP system is critical to its success. As the researchers point out, in the three organisations which experienced a very successful ERP implementation, the management accountants had been involved in all phases of ERP implementation. In the two companies which had a less successful ERP adoption, the participation of management accountants had been limited to the final phase of implementation only. Finally, in a similar vein to Sayed’s (2006) study, Grabski et al. (2009) suggests that management accountants need to acquire new skills, including IT, interpersonal, leadership, decision-making, analytical and planning skills in order to meet the requirements of their new roles.

3.4. Summary of Interpretivist Empirical Research

The review of interpretivist research supports the first conclusion drawn from the review of positivist empirical studies, namely that ERP systems appear to have predominantly driven transaction-oriented changes in management accounting such as automation in information processing. As a result, management accountants may lose some control over their traditional tasks. The review of interpretivist research also corroborates the second conclusion drawn from the review of positivist research that ERP systems appear to be weak in driving strategic-oriented changes in
management accounting. Specifically, there is evidence that ERP systems reinforce the use of traditional accounting practices rather than enabling the introduction of sophisticated accounting techniques. The review of interpretivist research also finds that ERP systems are not sufficient in terms of enhancing reporting (e.g. development of cost reports), and, as a consequence, spreadsheets are often used by management accountants in order to report relevant information to decision makers.

The review of interpretivist research identifies independent variables which may further explain the relationship between ERP systems and management accounting, and have not been tested in large research samples. For example, Grabski et al. (2009) find a positive relationship between the participation of management accountants in ERP implementation and the extent of change in their role. Furthermore, Caglio (2003) reported the important of the CFO in ERP implementations. This suggests that control of an ERP implementation may be regarded as an independent variable which influences the extent of management accounting change. Some further support for this is provided by the findings of Dechow and Mouritsen (2005) and Sayed’s (2006). A further explanatory variable which may influence the impact that ERP systems have on management accounting practices and the role of management accountant is the level of IT skills of management accountants. In the case study conducted by Caglio (2003), management accountants focused not only on the analysis of the information generated from the system post ERP implementation, but also on its maintenance and development. Caglio (2003) suggested that management accountants should enhance their IT competencies in order to carry out these tasks effectively. Sayed (2006) also shows that with the acquisition of IT skills, management accountants were able to represent themselves as experts in terms of achieving the benefits of an ERP implementation. Finally, the review of research studies suggests that the level of complexity of an ERP system should also be a relevant independent variable. In interpretivist works (e.g. Granlund and Malmi, 2002; Dechow and Mouritsen, 2005; Quattrone and Hopper, 2005; Kholeif et al., 2007; Granlund, 2007), where ERP systems were deemed by the interviewees to be very complex information systems, the management accounting benefits were limited to the transactional level. Although there were endeavors to utilise sophisticated accounting techniques, these techniques could not be supported effectively by the ERP system because of the complexity of its architecture.

3.5. Empirical Research Combining Positivism and Interpretivism

To date, only one study within the research area of ES and management accounting has combined positivist and interpretivist research methods, namely a survey and case study method. Newman and Westrup (2005) conducted a survey of UK CIMA management accountants and a series of case studies involving 34 interviews in manufacturing firms (seven in the UK and two in Italy) in an attempt to understand the implications that ERP systems have for management accountants. Using 122 responses, the majority of the respondents (83%) indicated that the management accountants experienced positive changes as a result of the advent of an ERP system. The findings also suggest that post ERP implementations management accountants focus on the analysis of information produced by the ERP system in
order to support decision-making (Doran and Walsh, 2004; Jean-Baptiste, 2009; Sangster et al., 2009; Newman and Westrup, 2005). Hence, they conclude that ERP systems may transform management accountants into business advisers. Newman and Westrup (2005) also report that management accountants lose some control over their traditional tasks as a result of ERP implementation. In addition, management accountants were able to retain overall control over the ERP system. This finding reinforces the possible influence of the independent variable “control of ERP implementation” which was identified through the review of interpretivist studies.

The findings of the case studies undertaken by Newman and Westrup (2005) largely corroborate the results of their survey. These indicate that when an ERP system has been implemented, management accountants are free from routine tasks enabling them to focus on information analysis and interpretation in order to advise decision makers. In other words, management accountants acquire the role of business advisers. The authors also suggest that enhanced IT skills are one of the main abilities required by management accountants in an ERP environment. Finally, the findings of their case studies lead Newman and Westrup (2005) to confirm the findings from earlier studies (Granlund and Malmi (2002) and Scapens and Jazayeri (2003)) that ERP systems are unable to facilitate the development of reports in an appropriate manner because of their immense complexity. As a consequence, management accountants often use separate systems in the form of spreadsheets to present the information produced by the ERP system.

4. Discussion and Conclusions

At a general level, what can be inferred from the review of the extant empirical research on ES as it interrelates with management accounting is that ERP systems appear to exert a significant influence on the transactional aspect of management accounting, but appear to have a rather moderate impact at a strategic level. This perception is in line with that of Brignall and Ballantine (2004) that ERP systems have benefited their adopters more with respect to transactional efficiency, and less so with respect to strategic planning.

The first major finding to emerge from the literature review is that ERP systems can make accounting information more comprehensive and reliable, and can increase flexibility of its generation and provision. The second major finding is that post ERP implementation, management accountants may lose some control over their traditional activities, as tasks such as information gathering and provision may be carried out by the ERP system and non-accountants. As a result of ERP implementation, management accountants are more likely to be involved in value-adding activities, such as information analysis and interpretation and management of the ERP system. Therefore, it can be inferred that ERP implementations have the potential to upgrade the role of the management accountant to that of business adviser.

The literature review also suggests that due to their transactional efficiency, ERP systems have generally reinforced the use of traditional management accounting practices and made them more integrated, detailed, accurate, automated and timely.
Conversely, it may be deduced that ERP systems do not effectively support the utilisation of sophisticated accounting techniques within organizations. Although the results of several surveys suggest that post ERP implementations, management accounting techniques such as ABC, target costing, quality costing, the BSC and benchmarking, were introduced, the overwhelming majority of these techniques were adopted by only a small number of ERP adopting organisations. A general finding arising out of the review of interpretivist studies is that ERP systems do not enable the utilisation of sophisticated accounting techniques because of the immense complexity of their architecture. For the same reason, ERP systems often provide insufficient information to facilitate the development of managerial reports (e.g. cost reports), and, as a result, management accountants are forced to use other systems such as spreadsheets in order to present the information produced by the ERP system to decision makers.

The literature review has provided a picture of the changes that may occur to management accounting practices and the role of the management accountant post ERP implementation. However, it can be argued that the relationship between ERP systems and management accounting is still obscure. Indeed it has been suggested that research on ES as it interrelates with management accounting is at an early stage of development (Arnold, 2006; Stefanou, 2006; Berry et al., 2009; Granlund, 2011). As a result, Sutton (2006) argues that “we really need to move to the next stage with the development of more generalized theories that help us to understand the phenomena in a more generalized fashion” (p.3). As the literature review indicates, in order to proceed to the next stage we need to understand better under what conditions ERP-related changes in management accounting take place and what the independent variables are in relation to this. As noted in the beginning of this paper, these are variables which exert influence on the extent of change in management accounting practice and on the role of the management accountant resulting from ERP implementations.

In an earlier review of the related literature, Rom and Rohde (2007) concluded that ERP systems cannot alone drive revolutionary changes in management accounting, such as strategic-oriented changes including greater adoption of sophisticated accounting techniques. Rather, ERP systems can simply facilitate such changes. The current literature review has identified the following five independent variables which may drive management accounting change: control of ERP implementation, level of complexity of ERP system, level of IT skills of management accountants, level of sophistication of management, and use of a BI system as ERP superstructure. Additional independent variables, which do not result directly from the literature review, but may exert influence on the extent of change in management accounting practice and in the role of the management accountant resulting from ERP implementations, are: cost of ERP implementation, length of the time the system has been operational, brand of ERP system, number of implemented ERP modules, number of implemented BI modules, implementation of BI financial module, implementation of a customer relationship management system, implementation of a supply chain management system, company size and sector of economic activity. Given that limited previous research has investigated the impact of these variables, accounting researchers should focus on these issues in order to enhance our understanding of the relationship between ES and management accounting.
The present review suggests that previous empirical research at the interface of ES and management accounting has tended to focus on describing changes in management accounting practice and in the role of the management accountant resulting from ERP implementations rather than focusing on carefully analyzing and understanding these changes. Whilst researchers have indicated how ERP systems may impact on management accounting practice and on the role of the management accountant, they have largely neglected to consider the explanatory variables of these impacts. To date, there is a lack of research which has attempted to provide a sufficient explanation for the differences among ERP adopting firms with regard to the perceived management accounting changes of ERP implementations. Although recent studies (e.g. Spathis, 2006; Grabski et al., 2009; Sangster et al., 2009) have increased our understanding of the relationship between ERP systems and management accounting, substantially more research is needed in order to draw valid conclusions on this subject.

In this paper, a number of independent variables which may exert influence on the extent of change in management accounting practice (i.e. first dependent variable) and in the role of the management accountant (i.e. second dependent variable) resulting from ERP implementations have been proposed. It is believed that the investigation of the relationship between pertinent variables will help academics and practitioners to achieve a better understanding of the impact that ES have upon management accounting. In order to gain more valuable insights into this issue, future research might adopt existing information systems theories (e.g. diffusion of innovations theory, flow theory, technology acceptance model, theory of planned behavior) as the principle theoretical lens through which to investigate the phenomena under consideration. However, caution should be applied in theory selection, as there are information systems theories (e.g. contingency theory, agency theory, transaction cost economics) which “while providing some valuable insights into the area, they seem to push research into questions and problems that are many times far from the everyday practice of accountants…” (Granlund, 2011, p.6). Future work should seek to develop a research model which will integrate the variables (independent and dependent) identified in this paper with mediating variables used in existing information systems theories.
References


