

**The Impact of Enterprise Resource Planning Systems on Management
Accounting: an Australian Study**

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The Impact of Enterprise Resource Planning Systems on Management Accounting: An Australian Study

Abstract

Information technology is significantly changing the operating practices of an increasing number of companies globally. These developments have important implications for the accounting profession and in particular accounting practices in the twenty-first century. This study examines the development of enterprise resource planning (ERP) systems as a means of illustrating how changes in information technology allows all systems in a company to be linked to manage operations holistically.

The study investigates the change in accounting systems using a sample of Australian companies with emphasis on the adoption of ERP systems including the potential impact of ERP on capital budgeting processes. The results show that ERP systems are changing management accounting practices, although at this stage, the impact on capital budgeting techniques appears to be limited. The findings contribute to the emerging body of literature on the development of ERP systems and its impact on management accounting teaching and research.

Key words: Management accounting, capital budgeting, enterprise resource planning systems, information technology.

1. Introduction

During the past decade an increasing number of companies have been impacted by information technology in terms of computerized transaction processing and electronic telecommunications such as that done with the Internet, intranet, and extranet. For competitive reasons, companies have had to change from manual and then mainframe systems to what has been called enterprise resource planning (ERP) systems. An ERP system has a common database or data warehouse that links together all systems in all parts of a company including, for example, capital budgeting with financial, control, manufacturing, sales, fixed assets, inventory, human resources modules, etc. An ERP system, by linking all systems through a data warehouse, allows a company to manage its operations holistically.

A second impact of ERP systems has been a general shift to manage at the activity level rather than at the more abstract level of financial transactions. This means that management accounting, with its focus on activities, can be most effective when it is used with ERP systems to incorporate the activity level for costing and performance measurement. To be effective an ERP system will contain an extensive chart of accounts or codes for activities such as accurate recording and tracking of activities, revenues and costs. The coding incorporates stable entities of a business, such as divisions, plants, stores, and warehouses. At a detailed level there are codes for functions such as finance, production, sales, marketing, and materials management. There are also the traditional financial account codes such as assets, liabilities, revenues, and expenses, and the central ERP feature of coding processes, activities, and sub-activities. There must be consistent coding among all parts of a company in order for them to relate to one another.

As the ERP system incorporates activities in terms of quantities of resources, including labour, a record of resource use is maintained. Therefore, performance can be measured in physical terms and compared to standards, which allows for the calculation of variances. This performance measurement at the activity level serves as a feedback system on efficiency and effectiveness. The confusion from abstract monetary measures is erased, and what is actually happening with the conversion of resources into goods and services can be seen. ERP systems have the potential to change management accounting systems with more detailed, more integrated, and faster produced information.

To date the research on the impact of ERP systems on management accounting can best be described as preliminary. It has involved case studies of one or two companies at a time and some field studies. The findings from these studies have been largely anecdotal. Also, some have been deductive in that arguments based on ERP attributes have been made on how management accounting should be affected. For instance, in a field study, Cook *et al.* (2000) described activity-based capital budgeting at a division of a US telecommunications company. The findings from Cook *et al.*'s field work suggests that ERP systems can increase the effectiveness of capital budgeting by anchoring financial numbers to activities rather than stopping at monetary measures with pre-ERP practices.

The goal of this paper is to investigate the change in accounting systems using a

sample of Australian companies with emphasis on the adoption of ERP systems including the potential impact of ERP on capital budgeting processes. Prior research in the Australian environment has indicated that the economic/institutional setting is significantly different from the US and European environments as Australian companies are smaller, with fewer multinational subsidiaries and more homogenous management background in terms of culture and educational background (Matolcsy et al., 2005). Given these differences in the Australian environment Matolcsy et al claim that the benefits of ERP systems are likely to be more pronounced and measurable, at least in the short run in Australia. The significance of the study is its contribution to the emerging body of literature on the development of ERP systems and has the potential to provide useful contrast and/or confirmation of the limited research from mainly US based studies. Furthermore this study contributes to the body of knowledge of the impact of ERP on management accounting teaching and research using a broadly based sample of corporations in an Australian setting.

In ascertaining the impact of information technology on management accounting, this paper will have the following additional sections. The second section contains a literature review of the impact of information technology on management accounting. With the literature review, the third section develops the research method and determines the sample used to ascertain the impact of ERP systems on management accounting practices of Australian companies. The fourth section will contain the findings, while the fifth and sixth will be the discussion and conclusion, respectively. Recommendations for future research will be included in the conclusion.

2. Literature Review

2.1 The integration of ERP systems into management accounting

Expectations for ERP systems to change management accounting were introduced by Kaplan and Cooper (1998, pp. 11-24), especially with the fourth of their four-stage model for cost and performance measurement systems. When a company had first stage systems, those systems were basically inadequate for all purposes, even for financial reporting. When they make improvements, the first stage companies tend to add financial systems to meet regulatory requirements. As a result, they evolve into second stage systems where financial reporting systems dominate; these companies are financial reporting driven. The companies with third stage systems have customized, managerially relevant cost management, financial reporting, and performance measurement systems, however, these systems are standalone. ERP systems only occur with the fourth stage systems where the ERP systems integrate cost management, financial reporting, and performance measurement (Kaplan and Cooper, 1998, p. 299).

An ERP system has a common data structure that permits data to be entered and accessed from anywhere in the world (Kaplan and Cooper, 1998, p. 275). An activity-based costing system is an integral part of an ERP system, and thus managers have information about present and future activities at operational levels when making decisions (Kaplan and Cooper, 1998, pp. 275-277, 285). With activity-based information, monetary distortions can be reduced. Feedback with activity information improves learning. Thus, in managing at the activity level, costing, budgeting, performance measurement, bonuses, resource spending, forecasting, budgeting, production, etc. can be

improved in terms of efficiency and effectiveness. An ERP system will allow the company to obtain cost and performance information more frequently, even daily, rather than waiting a month (Kaplan and Cooper, 1998, p. 279).

Kaplan and Cooper (1998, pp. 301-306) state that the integration with ERP systems allow all managerial processes, including budgeting, what-if analysis, and transfer pricing to be also based on activities rather than only dollars. Activity-based budgeting gives companies the opportunity to authorize and control resources based on accurate demand information. Accuracy increases because activity-based budgeting is based on facts, and less upon power, influence, and negotiating ability. Furthermore, the activity-level focus of budgeting leads to more accuracy in forecasting the demands for all direct and, especially indirect activities.

At the same time as Kaplan and Cooper's (1998) important book, Davenport (1998, p. 122) wrote "the business world's embrace of enterprise systems may in fact be the most important development in the corporate use of information technology in the 1990s." Davenport (1998, p. 127) expected companies to change with the implementation of ERP systems:

In addition to having important strategic implications, enterprise systems also have a direct, and often paradoxical, impact on a company's organization and culture. On the one hand, by providing universal, real-time access to operating and financial data, the systems allow companies to streamline their management structures, creating flatter, more flexible, and more democratic organizations. On the other hand, they also involve the centralization of control over information and the standardization of processes, which are qualities more consistent with hierarchical, command-and-control organizations with uniform cultures.

The paradox with ERP systems – streamlined, flatter, and more flexible and democratic (i.e., more control at the frontline) and centralization of control over information and the standardization of processes (i.e., more control at the centre) -- makes Davenport (1998, p. 131) ask how will ERP systems affect companies? Another equally relevant question would be, how will ERP systems affect management accounting?

Taken together, Kaplan and Cooper (1998) and Davenport (1998) suggest that ERP systems will change companies, but these researchers do not specify the nature of these changes. They certainly do not explicitly specify how ERP systems will impact on management accounting. Nevertheless, it is possible to infer that changes will occur to management accounting from the integration among cost management, financial reporting, performance measurement, and all other systems. Thus, it is not surprising that there has been some exploratory research prompted by Kaplan and Cooper (1998) and Davenport (1998) on the impact of ERP systems on management accounting.

2.2 The practical application of ERP systems – capital budgeting.

As previously outlined, a field study conducted by Cook *et al.* (2000), described the operation of activity-based capital budgeting as a division of a US telecommunications company. In their study Cook *et al.* found that the activity information was linked to the financial accounting system, thus behaving like an ERP system for the purpose of capital budgeting. This approach went beyond the traditional capital budgeting by linking the traditional incremental monetary revenues and costs with

underlying activities. The authors concluded that by separately identifying the level of revenues and costs associated with process activities, the uncertainty with such activities and related revenues and costs can be closely examined. They added that this activity-level capital budgeting gives managers far more information and understanding than possible from the traditional financial simulation of aggregated income-statement approach. Their arguments were convincing but could not be verified.

Hope and Fraser (2001; 2003) disclosed that some companies have ceased traditional budgeting processes. Four reasons have been put forward by Hope and Fraser (2001) as to why existing budgeting processes are failing:

- few companies are satisfied with their budgeting processes
- far too much time is spent on budgeting and too little time is spent on strategy
- Financial capital is now a small part of market value
- Budgeting is expensive and adds little value either to the company or its users (Hope and Fraser, 2001, pp. 7-8).

They claimed that hierarchical companies have devolved to networks, where the planning capacity and control inherent in budgeting can be accomplished by other means (Hope and Fraser, 2003, p. 108). ERP systems, which they label enterprise-wide information systems, are important for eliminating budgeting, particularly when accompanied by the balanced scorecard, shareholder value models such as EVA, activity-based costing and management, rolling forecasts, and benchmarking (Hope and Fraser, 2001, pp. 5-6).

Some of the companies identified by Hope and Fraser (2003) -- for example, the Scandinavian bank, Svenska Handelsbanken, -- abandoned budgeting before ERP systems. This suggests that, for those companies, ERP systems would not have been essential for effectiveness without budgeting. Perhaps, ERP systems will allow contemporary companies, with ERP system, to be effective without budgeting. The impact of ERP systems on budgeting is still an empirical question.

It was noted from the findings of Cook et al. (2000) and Hope and Fraser (2001, 2003) that there was a lack of empirical studies on the impact of information technology on capital budgeting. Additional empirical testing was provided by Granlund and Malmi (2002). Following from Kaplan and Cooper (1998) they noted the "lack of studies examining the organizational and behavioural aspects of these systems" (p.300). Their purpose was "to examine the effects of integrated, enterprise-wide information systems on management accounting and management accountants' work." As they concluded there was "no scientific evidence on the research topic" they decided to use an exploratory field study to provide "insights" for subsequent research. Sixteen persons were interviewed at 10 large almost exclusively SAP R/3 adopters. They found no major direct or indirect impacts of ERP on management accounting systems (p. 309). The changes that did occur did not lead to changes in the logic of management accounting systems.

2.3 ERP and its impact on the work of management accountants

Although none of the recent studies on the impact of ERP systems have indicated changes to management accounting systems, there have been some studies that indicated effects on the work of management accountants. For example, Burns and Baldvinsdottir

(1999), Coglio (2003), Quattrone and Hopper (2001, 2005), Granlund and Malmi (2002), Baxendale and Jama (2003), Meall (2003), Scapens and Jazayeri (2003), and Dechow and Mouritsen (2005) have addressed the effects of changes to management accounting systems. Each of these studies will be discussed briefly below.

In a field study of a single company, Burns and Baldvinsdottir (1999) observed that SAP centralized the accounting function and decentralized control to many people in the company who became “hybrid accountants”. The traditional core activity of management accountants, posting the books, was delegated to others in the company. They cite the director of finance saying: “They may post the odd correctional entry. In fact some analysts aren’t allowed to post. They generally are analytical people rather than analytical accountants.” Management accountants have become analysts.

Caglio (2003) studied an Italian company to understand how the implementation of an ERP system challenges the definition of the expertise and roles of accountants. Caglio (pp. 140-141) found three structural characteristics that jointly materialized during the project:

- a higher degree of standardization of accounting activities and practices;
- a stronger need for integration and interfunctional collaboration; and
- a more prominent role for the accounting department in the management of the new IT system.

Quattrone and Hopper (2001, p. 403) undertook two case studies of ERP implementations to obtain insights into how new systems give rise to multiple spaces and times within [companies].” The case studies were conducted over 12 months at multi national companies that were implementing SAP systems (pp. 410-411). One study included various hierarchical levels and locations in a large American multinational company. Twenty managers were interviewed. The other study was the sales and distribution function of the European headquarters of a Japanese multinational company. Twelve managers were interviewed in this second study.

Quattrone and Hopper (2001, pp. 420-426) found that with the implementation of the ERP system, control went from a single point or “totalitarian” view of control with the controller during periodic reporting to a multiplicity of loci of control available at anytime. Anyone with access to an ERP system can “exert control as they wish, slicing and dicing the organization and information, and defining what should be controlled, how and why, differently.” They add that, “integrated business functions decide what is best for each business area and accountants analyze how this can be obtained.” They conclude that if the centres of control are changed as with ERP implementations, it is necessary to re-conceptualize accounting and control (p. 430).

In a later paper dealing with the same two subject organizations, Quattrone and Hopper (2005, p. 760-761) concluded each organization adopted different strategies, which resulted in different configurations, implementations and usages of the ERP system.

Granlund and Malmi (2002), mentioned earlier, also studied the effects of ERP systems on management accountants’ work with preliminary and brief field studies at 10 companies. The working hypothesis that ERP systems would allow management accountants to devote more time to business analysis was supported by five of the 10 companies (p. 311).

Baxendale and Jama (2003), from an assessment of ERP system functionality,

conclude that management accounting data integrity and reliability will increase. The use of relational databases allows information to be shared rather than re-entered. Formal processes exist in ERP systems to ensure reliability by automatic counts and reconciliations. These conclusions were not empirically tested.

Meall (2003) studied the transition of budgeting at the UK company, Southern Water from spreadsheet application to ERP based budgeting. Anecdotally, Meall reported that the ERP-based budgeting system reduced budget preparation time, allowed more time for analyses, and increased collaboration. This case study did not suggest that the ERP system could make budgeting redundant as did Hope and Fraser (2003), but instead suggested that ERP systems can improve the efficiency and effectiveness of budgeting.

Scapens and Jazayeri (2003, p. 203) reviewed the literature to find that “ERP systems are having relatively limited impacts on management accounting and management accountants.” In view of the literature, the purpose of Scapens and Jazayeri study (2003, p. 204) was “to explore the processes of change and to examine in more depth the nature of the changes in management accounting which have accompanied the implementation of an ERP system ... within a specific organization.” The field study was conducted from 1996 to 1999 at the European division of a US company. The process focus to study management accounting was crucial, according to these authors, as ERP systems are process systems. The latter lead to more information sharing and teamwork on one hand and greater centralization of information processing activities (pp. 216-218).

Scapens and Jazayeri (2003, pp. 224-229) judged the ERP system to have led to a number of changes to management accounting, i.e., the elimination of routine jobs, the development of accounting knowledge in line managers, the production of more forward looking information, and a wider role for management accountants. More specifically, Scapens and Jazayeri (2003, p. 224) state that the move from record-keeper to internal consultant requires management accountants to acquire new skills. Rather than information reporters, management accountants need to be sales persons and change agents. In their view management accountants need to sell ideas for accomplishing strategy with information. Scapens and Jazayeri (2003, p. 226) were not convinced that ERP systems drive the change in management accounting. Overall their findings were unclear in suggesting causes of the changes to management accounting.

Dechow and Mouritsen (2005) studied two Danish organizations to understand the impact of ERP systems on integration and control. They found that ERP systems “are highly involved in transforming and establishing management control agendas through concerns for integration.” (pp. 724-725). In particular, Dechow and Mouritsen concluded that integration is not a solution but rather a means by which to problematize through the process. They noted that this represented a way of transporting information across localities in such a way that suited the needs and requirements of different parties and different times.

2.4 Summary of findings from prior literature

Overall the findings from prior literature on the impact of ERP systems on management accountants do not completely agree that ERP systems will change the work of management accountants in particular ways. Nevertheless the prior literature suggests that management accountants will be less likely to do routine tasks and more likely to be involved with analysis. Similarly, the prior studies suggest that the output of management

accountants will likely be more precise, more accurate and produced more frequently. However, there is no conclusive evidence to support these expectations from the research on how ERP systems impact capital budgeting, budgeting, and other components of a management accounting process. In summary, there is confusion in the literature as to the potential for ERP systems to change management accounting and a lack of clear identification of the changes that have actually occurred. Burns and Scapens, (2000) suggest that perhaps, management accounting will take longer to reflect changes because of institutional forces.

3. Research Method

3.1 Background to the research approach

This preliminary study will be guided by the literature, which contains substantial ambiguity about the impact of ERP systems on management accounting. Although the focus of this study relates to the process of management accounting, special attention is devoted to the impact of ERP systems on capital budgeting as a specific and important management accounting technique.

In committing to investments with returns that come later, capital budgeting has the inherent challenge of dealing with uncertain future events. In addition, the economic effects of capital projects are difficult to track to future revenues, expenses and costs because the spreadsheets that have been used for analysis are not typically connected to the company's accounting and operating systems, past, present, or future. This has resulted in the sometime approval of the wrong projects, and more importantly the inability to ascertain what the implemented projects will accomplish in terms of revenues, costs, expenses, and resulting profits. According to Cook *et al.* (2000), these shortcomings in capital budgeting techniques can potentially be reduced or eliminated with the increasingly prevalent ERP systems.

3.1.1 Traditional approaches to capital budgeting

Capital budgeting can be changed by ERP systems. As noted, it has been done separately from the firm's accounting and operating systems, past, present, or future. In a traditional non-ERP setting capital budgeting may be completed separately with a spreadsheet. For example, given a project for outlays for replacement equipment where the time frame for the internal rate of return or net present value calculation could be 10 years. The project could include an improved production process to reduce material waste as well as labour costs. Also, the new process could reduce the time for set ups for different product runs, and thus enable the capture of special orders where quick response is necessary.

As IRR/NPV analysis is incremental, the spreadsheet would show the incremental cash flows for capital outlays, reduced material costs, reduced labour costs, and the contribution from the additional sales. However, the data items on the spreadsheet of pre-ERP capital budgeting are not explicitly linked with what activities happened, what activities are happening, or what activities will happen in the future. This separateness can be resolved by ERP systems integrating capital budgeting with companies' accounting and other systems.

3.2 Benefits of ERP for capital budgeting decisions

Potentially, capital budgeting can be done significantly differently with a functioning ERP system because of the integration of accounting and other systems. The common unified data warehouse is able to integrate, for example, financial transactions, activities in activity-based costing (ABC) and activity-based management (ABM) sub-systems, budgets and plans, and performance measures such as customer satisfaction or an entire balanced scorecard. Of course for these expectations to be realized, companies would need to have a full range of ERP modules, which may be presently uncommon.

Consider how ERP systems impact capital budgeting in its three stages, (1) preparation and approval, (2) operational, and (3) post audit. During the first stage, the ERP system will allow the revenue and cost items to be linked to actual activities. For example with new equipment, if some of the costs are labour, the actual model for labour use in manufacturing will be assessed and improvements in labour productivity due to the new asset will be modelled. Modelling allows alternative approaches or variants to be tested and understood. Similarly, if there is a change in material usage, this will be modelled and the impact considered in the capital project evaluation. In effect, ERP systems allow capital projects to be modelled as mini independent businesses or investment centres.

For the second operational stage, the models used in the first stage, preparation and approval can be compared to the actual model in use regarding labour, material, and asset input and the actual outputs. In effect, the modelled assumptions can be explicitly validated with experience. Similarly, for the third stage at or near the end of the project the models can be assessed to do a post audit to determine the life-time success of the project and to provide feedback on the capital budgeting process.

As with capital budgeting, the impact of ERP systems could be deductively specified, or more precisely conjectured for other management accounting practices such as budgeting, operational statements, forecasting, performance measurement, and costing. The above capital budgeting example indicates that ERP systems have the potential to lead to greater integration, accuracy, speed, and effectiveness. As management accounting techniques involve company information, it would be reasonable to expect, from the implementation of ERP systems, improvements at least in integration, accuracy, speed, and effectiveness, if not a major change such as the elimination of budgeting.

3.2 Research Design

Most of the earlier research on the impact of ERP systems on management accounting have been field studies. Additionally, given the lack of conclusive findings in the literature about the impact of ERP this research will employ a survey of large corporations incorporating open-ended questions about changes in capital budgeting and other management accounting practices. However, it is proposed that this will be an exploratory study given that there is uncertainty as to whether there have been any significant changes to management accounting with greater use of ERP systems.

3.3.1 The sample

This exploratory study of the impact of ERP on management accounting was tested with Australian companies of sufficient size to have acquired ERP systems in the past 10 years. The sample consisted of 105 companies among the ASX-listed companies

with sales of more than \$400 million according to DatAnalysis¹. The companies represented classified industry groups including: automobiles and components; capital goods; chemicals; commercial services and supplies; construction materials; consumer durables and apparel; container and packaging; energy; food, beverage and tobacco; food and staples; hotels, restaurants and leisure; media; metals and mining; paper and forest products; retailing; software and services; telecommunication services; transportation; and utilities.

Larger firms tend to implement ERP systems for two reasons: their size indicates they can afford the required monetary outlays and they require the systems to look after their extensive and routinized transactions. Capital budgeting was deemed important for the above industries, which tend to be capital intensive. The Chief Financial Officers (CFOs) of the companies were identified through DatAnalysis in order to telephone them to verify the incumbent CFO, exact name and title, address, and telephone number. New Zealand and foreign headquartered companies were eliminated because of the expected difficulty in gaining responses. In addition, companies were dropped from the sample where the CFO could not be identified or verified. This process resulted in a reduction of the sample size from 105 to 90 companies ranging in size from \$400 million to \$34 billion in sales.

3.3.2 The Survey Instrument and its Administration

As there has been a lack of conclusive findings in the literature, it was decided that open-ended questions about the changes that are occurring with capital budgeting and other management accounting practices would be a feature of the survey sent to participating companies. This approach recognizes Scapens and Jazayeri's (2003, p. 226) concern that the changes occurring with management accounting may be caused by non-ERP factors. The survey asked various demographic questions about the role of the respondent within the organisation, the type of industry represented by the firm and the gender of the respondent. In terms of the questions specifically related to management accounting practices and capital budgeting, there were a range of yes/no questions as well as questions inviting respondents to describe practices and changes in practices over the past 10 years within organisations. A copy of the survey is provided in Appendix 1.

The survey was sent to the 90 CFOs in May 2005, with follow up requests being made in June and August. Respondents were given a choice of responding either by mail or through a web response. Telephone contacts were made to non respondents together with a second and third mailing of the survey. There was a great willingness among most telephone-contacted CFOs to respond, but they often admitted to pressing priorities. Those CFOs who claimed to have responded or who were unwilling to respond were eliminated from subsequent mailing and telephone follow ups. CFOs with less than 10 years of experience tended to involve an employee with the required experience or stated they chose not to respond.

4. Results

4.1 Demographics of Respondents

Of the 90 CFOs sampled, 35 responded giving an overall response rate of 38.9 percent. Table 1 shows the demographics of respondents. Two respondents self identified

as female and 33 as male. The median size of the sampled companies was \$1.1 billion (based on information from DatAnalysis) and respondents were representative of a range of industry types with Industrial (17 per cent), Consumer Staples and Materials (both 20 per cent) being the most highly represented industry groups.

INSERT TABLE 1 HERE

4.2 Impact of information technology on Capital Budgeting

The first five questions in the second section of the questionnaire related to the impact of information technology on capital budgeting techniques. Table 2 provides a summary of the responses to the summary questions, while the open-ended responses are summarised in each category of discussion below.

INSERT TABLE 2 HERE

4.2.1 Changes in Capital Budgeting Techniques

In the first instance respondents were asked to indicate whether or not the firm's capital budgeting techniques had changed in the past 10 years. Twenty-nine (83 per cent) of respondents stated there had been changes to capital budgeting techniques, while six indicated that there had been no changes.

In identifying the nature of the changes in capital budgeting techniques, respondents were asked to specify the nature of the changes. Responses were received from 26 companies. The most common themes were (1) an increased use of analytical or measurement tools for capital budgeting, such as risk adjusted profitability index, risk adjustments, ROI, WACC, DCF, IRR, payback, and (2) an increase in formalisation and rigor in the overall process, such as an investment management committee, capex manual.

4.2.2 ERP and its impact on Capital Budgeting Techniques

Seventy-seven per cent (26) of respondents indicated that their companies had ERP systems such as SAP, Oracle or PeopleSoft. In addressing the possible impact of ERP systems on capital budgeting techniques, only nine respondents stated that this was the case. Respondents who stated that their ERP system affected capital budgeting, noted that ERP systems provide capital budgeting with better information. Recognizing that the ERP system provided better information, one respondent said,

The amount and quality of information available with which to make capital budgeting decisions has vastly increased. The system essentially is a database of information that can be mined. Higher levels of system integration feeding into the core accounting systems have also increased the sophistication of the process.

Another respondent admitted the ERP system provided better information, but added that

“the information is available in the system but most of the process is Excel driven therefore largely unchanged.”

The ERP systems also allow the capital budgeting processes to be stored online, which allows for approvals by various levels to be done more easily. This improvement in the process occurs despite capital budgeting becoming more integrated and more complex.

4.3 Changes to Management Accounting Systems

The second part of the questionnaire addressed the impact of information technology more generally on management accounting systems. For example, respondents were asked to describe how their companies' management accounting systems changed in the past 10 years using five headings: budgeting, operating statements, forecasting operating performance, performance measurement and costing.

4.3.1 Budgeting

Thirty-one respondents reported changes to budgeting in the past 10 years. The change to budgeting identified by respondents in order of frequency was: more rigorous, aimed at maximizing shareholder value, more accurate, more automated, more comprehensive, more integrated among financial statements, for more periods of time, revised more frequently, more sophisticated, more structured, more disciplined, simultaneously "top-down" and "bottom-up," more detailed, more transparent, easier to review, and more strategic. Many companies were replacing spreadsheets with integrated budget modelling software. The budgeting process was the same, but information technology made budgeting more functional. One respondent stated:

Divisional and segment budgets have moved from being focussed on outputs (i.e. particular categories of expenditure) to being focussed on outcomes (i.e. overall profitability). The budget process has also been rationalized to ensure information submitted to the board is concise enough for useful decision making.

4.3.2 Operating statements

There were 29 responses; outlining changes to operating statements in the past 10 years. These changes included in declining frequency: more automated; more focus on KPIs; more refined; more transparency; more comprehensive; more focus on non-financial performance measures; more detailed; more focus on cash flows; more focus on marginal returns and ROC; more standardization; more segmented reporting; more analysis of costs; more in line with accounting standards and best practices; operating statements now available online in real-time or next day. Several respondents summed up the changes to operating statements as follows:

- *"No substantial change other than greater use of information technology in the process."*

Some respondents mentioned the use of advanced tools such as OLAP (online analytical processing), Hyperion, and Cogros in addition to various ERP systems.

- *"A feature of the last 10 years has been different divisions operating on different ledgers and charts of account. Moving to a single ledger and chart of accounts is one objective of the ERP system."*

4.3.3 Forecasting

There were 31 responses related to changes to forecasting in the past 10 years. The responses in declining frequency were: more frequent forecasting or re-forecasting; rolling forecasts; more detailed; moved from spreadsheets to Hyperion or other management support system; better integration; longer forecasts; more accurate; more use of spreadsheets; and more consistency among organizational units.

One respondent, with an ERP system, summarized the changes:

Forecasting was completed on Excel spreadsheets and consolidated. Now forecasting is made easier as the actual data can be copied and forecast out within the one database, producing standard reports and consolidated within a much shorter timeframe. The focus is more on accuracy and analysis

4.3.4 Performance measurement

Responses were received from 32 of the 35 respondents in relation to performance measurement with only three respondents reporting no changes during the past 10 years. The changes in declining order of prevalence were: more KPIs; more non-financial performance measures; more financial performance measures: more analysis focused on leading indicators; greater emphasis on balance sheet and cash flow; greater depth and more targeting; more timely or real time; performance based incentives; extensive analytical support from the data warehouse; greater use of information technology; online goals and objectives; and performance measures provided to board.

One respondent, from a company with an ERP system, summarized the impact on performance measures as follows:

“Increased complexity of performance measurement systems due to increased knowledge of key business drivers, and the increased capabilities of a fully computerized integrated system.”

Another, with the ERP system, said timely performance information is no longer difficult to obtain.

4.3.5 Costing.

There were only 27 of a possible 35 responses related to changes in costing over the past 10 years. The changes to costing in declining frequency were: improved modelling; ABC introduced; more rigor and accuracy; refinements; more frequently updated; more summarization; more detail; better tracking; improved with centralization of plant costing; greater use of information technology; internal charging introduced; and absorption base used more widely.

4.4 Impact of computerisation on management accounting

All respondents indicated that computerisation had an impact on the company's management accounting system in the past ten years. From question 3, it was learned that 27 of the companies had ERP systems, thus eight companies must have used non-ERP computerisation to respond positively to this question. A further open-ended question

sought to gain feedback on the specific types of computerisation that had changed the firm's management accounting and control system. This question provides a different perspective on understanding management accounting change. Respondents from 30 of the companies explained how computerisation, which includes ERP systems, affected their management accounting. The most common response was similar to the following quote:

“Computerisation has considerably shortened reporting timeframes and increased levels of accuracy. Detail information is now available on a daily basis.”

Another respondent basically said the same, but added that this was all done while work volumes increased and staff levels remained stable/unchanged. Other descriptions of the changes included in order of declining frequency: more integrated; more computerized; more automated; streamlined and faster consolidations; faster production of information; greater transparency; more data integrity; real-time control; better understanding of fixed and variable costs; able to calculate profitability at lower organizational levels; more accuracy; year-end results can be more readily forecasted; increasing use of ABC and its derivatives; and more emphasis on value added activities. One respondent, at a company with an ERP system stated:

“More a case of better use by management of the existing computer systems platform than major investment in new platform.”

This with other responses implies that benefits from ERP take time to accrue.

5. Discussion

The process of capital budgeting, at the companies where the CFOs responded to this survey, would appear to have not changed greatly over the past ten years. There is no indication from the findings of this study that capital budgeting is being linked to the activity level as suggested by Cook *et al.* (2000). Only nine of the respondents with ERP systems stated that those systems affected capital budgeting suggesting that the impact of ERP systems on capital budgeting has been minimal and, probably, preliminary. ERP systems and other forms of computerisation have contributed to capital budgeting by (1) an increased use of analytical or measurement tools for capital budgeting, such risk adjusted profitability index, risk adjustments, ROI, WACC, DCF, IRR, payback, and (2) an increase in formalisation and rigour in the overall process, such as an investment management committee, capex manual.

The 90 companies were selected from the largest manufacturing and retail companies operating in Australia. There was no indication that the responding companies were biased, thus the results are highly suggestive of the status of capital budgeting in large Australian companies.

It was found that computerisation impacted the management accounting processes at all responding companies, although only 27 of the 35 had ERP systems. This finding suggests that non-ERP computerisation was also impacting on management accounting. It is difficult to separate out the exact impact of ERP systems from the more general computerisation which improved the functionality of management accounting. Every

aspect of management accounting improved, including more detail, more accurate, faster, more integrated, and improved data integrity. However, the same management accounting techniques were being used, but they were performing at a higher level.

Changes had occurred to all management accounting at the five identified areas in the past 10 years. Budgeting had been reported as changed in 31 of the 35 firms. In particular the functionality of budgeting had greatly increased by moving to spreadsheets and then to integrated budget models with ERP systems and such management support systems as Hyperion.

There were 28 responses out of a possible 35 that stated that operating statements had changed in the past 10 years. In particular, functionality had improved with computerisation, specifically ERP systems with their single chart of accounts and relational data warehouse. The operating statements had changed with more automation, real-time or next day production, with for example, more focus on KPIs.

Twenty-nine respondents said forecasting had changed in the past 10 years. Functionality improved by moving production to spreadsheets and then to ERP systems and management support systems such as Hyperion. Functionality also improved with performance measurement during the last ten years in 29 of the responding companies. Performance measurement was extended because of a greater understanding of operations and because of computerisation, particularly ERP systems; performance measurement was more extensive and timelier. Moreover, this greater level of performance was accomplished without increases in staff.

Costing was the management accounting technique where the least changes occurred, with only 21 companies being cited for changes in the past 10 years. Computerisation had contributed to costing improvements such as improved modelling, ABC implementation, and more rigor and accuracy.

6. Conclusion

ERP systems and computerisation are changing the practices of capital budgeting and management accounting. Based on this sample of Australian companies, the impact is important but, probably, preliminary. Computerisation is affecting management accounting, but it is difficult to sort out the impact of each. ERP systems lead to highly standardised and highly computerised information. Without fundamentally changing them, ERP systems are allowing capital budgeting, budgeting, operating statements, forecasting, performance measurement, and costing to be more detailed, more accurate, and reported more quickly.

The results of this study suggest that there have been no major changes to management accounting in the Australian context in the last ten years. The predictions of Cook *et al.* (2000) were not able to be substantiated from the findings of this study. There was no mention in responses of capital budgeting being done at the activity level. Actually, the findings were without any discussion of activity level management accounting, other than a few mentions that ABC had been implemented. In addition, there were no indications from the respondents that budgeting was being abandoned nor was there consideration being given to eliminate budgeting.

Computerisation, including ERP systems, is changing the way management accounting is being done in the current economic environment and thereby improving the functionality of management accounting techniques. The findings of this study suggest

that the least changes appeared to be occurring with costing.

There is another important inference to be gleaned from this preliminary survey. Prior to ERP systems, the main systems were owned by the CFO's unit. With ERP systems, the CFO is just one of the many owners, and management accountants must start accessing information produced by these others systems, which are integrated with management accounting systems, to assist management. Some respondents referred to these changes, especially to increased non-financial information. In other words, management accounting must move beyond accounting systems.

This research has limitations. The sample is not large, and the respondents may have biased and defective memories. Admittedly, the best method for studying management accounting change is longitudinal. However, archival data for longitudinal studies are very difficult to obtain and studies themselves are time consuming. This preliminary study suggests that such longitudinal studies would be valuable.

From this preliminary research a number of suggestions for future research and teaching have been inferred along three themes. The first is for a detailed examination of exactly how computerisation and ERP systems can improve capital budgeting and management accounting. There is need for more understanding of ERP systems, and how they relate to the existing management accounting techniques and more importantly identification of the common functionalities. There is also a need to understand how ERP systems are implemented, the time required and the costs and benefits from the various modules and various management accounting techniques. The strategic importance of ERP needs to be established. Is it necessary or an alternative to other forms of computerisation? The answer to this question requires detailed, longitudinal field work.

The research to date on ERP has largely been done without detailed understanding of the system processes. In the past ERP systems were considered "black boxes" that would have some impact on management accounting. The initial step in further research would be to carefully examine the functionality of ERP systems, particularly, in regard to management accounting. This should be done with colleagues in the information technology department/school, ERP vendors, and vendors offering management support systems such as Hyperion. Then there is the requirement to track the computerisation and ERP use at a group of companies longitudinally to understand how computerisation, including ERP systems, impacts management accounting and creates competitive advantage. Public information would be available, but also there would be the need to contact persons from the CFO area as well as persons in the IT area of the sampled companies.

The second theme for future research is an advocacy role for researchers, which may be a problem. However, if we consider management accounting to be an applied science like medicine, then like medical researchers we need to advocate. James McKinsey (1922) advocated budgeting, and founded the consulting company that has his name, McKinsey and Associates. Similarly, it was Cooper and Kaplan (1988) and Kaplan and Norton (1992) who, respectively, established activity-based costing and the balanced scorecard as management accounting techniques.

Third, there is an opportunity to instruct students on capital budgeting and management accounting in an ERP environment. It is likely that the simulation of a company and its ERP system would be needed to adequately prepare students for this change in environment. The pre-ERP approach to management accounting as paper and

pencil or Excel calculations would need to be replaced with the ERP approach to management accounting recognising ERP as a process within a set of systems.

Table 1 Demographics (n =35)

	frequency	%
Gender		
Male	33	94.3
Female	2	5.7
Position within organisation		
CFO	16	45.7
Finance Director	2	5.7
Executive Finance Director	5	14.3
Information Technology Director	1	2.9
Other	11	31.5
Type of Industry		
Energy	3	8.6
Industrial	6	17.1
Consumer staples	5	14.3
Telecommunication	1	2.9
Materials	7	20.0
Consumer discretion	7	20.0
Utilities	1	2.9
Other	5	14.3

Table 2 Capital budgeting techniques

Capital Budgeting	Frequency	Per cent
Changes in past 10 years		
yes	29	83
no	6	17
Introduction of ERP Planning system		
yes	27	77
no	8	23
Impact of ERP on capital budgeting		
yes	9	26
no	26	74

Appendix 1
The Impact of Information Technology on
Capital Budgeting and Management Accounting.

You are being asked to complete the demographic questions on this page and the questions on the reverse side.

Please select a position which best describes your role / position by placing a cross [X] in the appropriate box.

- | | | | |
|--------------------------|-------------------------------|--------------------------|---------------------------------|
| <input type="checkbox"/> | Chief Financial Officer | <input type="checkbox"/> | Executive Finance Director |
| <input type="checkbox"/> | Finance Director | <input type="checkbox"/> | Information Technology Director |
| <input type="checkbox"/> | Other, please specify, _____. | | |

Please select, from the list below, which best describes the industry of your firm by placing a cross [X] in the appropriate box.

- | | | | |
|--------------------------|----------------------------|--------------------------|------------------------|
| <input type="checkbox"/> | Energy | <input type="checkbox"/> | Materials |
| <input type="checkbox"/> | Industrial | <input type="checkbox"/> | Consumer Discretionary |
| <input type="checkbox"/> | Consumer Staples | <input type="checkbox"/> | Information Technology |
| <input type="checkbox"/> | Telecommunication Services | <input type="checkbox"/> | Utilities. |

Please place a [x] as appropriate for your gender.

- | | | | |
|--------------------------|------|--------------------------|--------|
| <input type="checkbox"/> | Male | <input type="checkbox"/> | Female |
|--------------------------|------|--------------------------|--------|

After completing the above questions, please turn to the other side of this page and, in writing, respond to the four questions. You may respond on the reverse page or on other pages as needed.

PLEASE RESPOND TO THE QUESTIONS BELOW IN THE SPACES PROVIDED.

1. Have your firm's capital budgeting techniques changed in the past 10 years? Yes [] No []

2. If you responded "Yes", please specify in the space below, the nature of those changes in capital budgeting techniques.

3. Does your firm have an Enterprise Resource Planning system (such as SAP or PeopleSoft) or comparable information technology systems? Yes [] No []

4. If you responded "Yes" to the above, has this computerisation affected your firm's capital budgeting techniques? Yes [] No []

5. If you responded "Yes", to the above, please describe in the space below, how has computerisation affected your firm's capital budgeting techniques?

6. Using the headings below, describe how your firm's management accounting and control system has changed in the past 10 years.

- Budgeting

- Operating statements

- Forecasting operating performance to the end of quarters/years

- Performance measurement

- Costing.

7. Has computerisation at your firm had an impact on your firm's management accounting and control system?

Yes [] No []

8. If you responded "yes" to the above question, please specify how computerisation has changed your firm's management accounting and control system.

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ⁱ DatAnalysis is an electronic business resource that provides detailed information on all companies listed on the Australian Stock Exchange. Included are corporate details, company history, extracts from company reports, financial tables, shareholder information, company announcements, and company reviews.