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ERP IMPLEMENTATIONS AND THEIR IMPACT UPON MANAGEMENT ACCOUNTANTS ¹

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ABSTRACT

This paper considers the impact of ERP implementations upon the role of management accountants, upon management accounting in general, and upon business processes. It does so in the context of the perceived success of the ERP implementation. A postal questionnaire was circulated to almost 700 management accountants working in large UK-based organisations. It finds that under successful ERP implementations, management accountants have time for other, less mundane activities and their role becomes more enriching. In contrast, when the implementation is unsuccessful, the role of the management accountant increases: the ERP system deficiencies require increased activity on their part without any noticeable reduction in the tasks they traditionally perform.

Keywords: ERP. Implementation, Success, Management Accountants, Management Accounting

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1. INTRODUCTION

Information technology (IT) should be viewed as more than just a vehicle that facilitates the automation of business processes: IT can fundamentally change the way business is done. Many organisations seek to improve their competitiveness through adoption of advanced information technology, such as Enterprise Resource Planning (ERP) systems. The level of success associated with these implementations has varied widely. Traditional analysis and design projects had minimal reengineering and the software was written to match current processes, whereas ERP systems are implemented with minimal change to the software while significant reengineering of business processes to match the ERP software occurs.

One reason for many ERP implementations being less than successful is that they adopted a traditional IT implementation philosophy, rather than an ERP implementation philosophy. That is, they focused on replacing the financial reporting systems and ignored the benefits that could have been obtained through the design and implementation of a system that integrated the operations of the entire organisation (i.e., including accounting, manufacturing, supply chain management, etc.).

As argued in Grabski et al. (2001), ERP systems are different from traditional systems in scale, complexity, organisational impact, cost and subsequent business impact. ERP systems typically impact the entire organisation and are almost always associated with the business process reengineering (Davenport, 2000). Consequently, an ERP implementation must be carefully managed and the changes in business practice required to maximise the benefits of the implementation need to be identified and enacted from the start (*see*, for example, Yusuf et al., 2004). Failure to do so can result in many difficulties (*see*, for example, Cameron and Meyer, 1998; Davenport, 1998; Deutsch, 1998). In some cases, the difficulties that arise can destroy the organisation, e.g. the FoxMeyer Drugs bankruptcy (Scott, 1999). Even when the future of the organisation is not threatened, the costs associated with ERP systems are significantly higher than those of traditional systems and mistakes such as these can be extremely costly – for example, Dell Computers spent millions of dollars on an ERP system that had to be scrapped because it was too rigid for the expanding nature of the company (Turnick, 1999).

Consistent with Carr (2003), even when ERP implementations are successful, organisations generally do not obtain any long-lived competitive advantage through them. What they do gain is that they avoid losing ground to other organisations that have successfully implemented ERP systems (Poston and Grabski 2001; Hunton et al. 2003). It can be argued, therefore, that once the time has come for an organisation to adopt ERP (possibly because competitors are doing so), it must do so or risk long-term competitive disadvantage. Consequently, many ERP systems have been re-implemented, sometimes as upgrades of successful systems. Others were, effectively, new ERP implementations often due to a failure to recognise the nature of an ERP implementation compared to that of a traditional IT implementation.

2. ERP SUCCESS FACTORS

Early research into ERP implementation success factors (e.g., Holland and Light 1999, Jarrar et al. 2000, Grabski et al. 2001, Somers and Nelson 2001, Akkermans and van Helden 2002) generated lists of factors that contribute to successful ERP implementation. However, they did not indicate whether all the factors were needed, or if all the factors needed to be used with the same level of effort. More recently, Aloini et al. (2007), emphasizing the importance of organisations focusing on ways to make their ERP implementation successful, looked at different approaches taken in the literature and compared them from a risk management point of view to highlight the key risk of failure factors and their potential impact on ERP projects success.

Grabski and Leech (2007) extended the research on control theory (e.g., Ouchi, 1979; Eisenhardt, 1985, 1989; Kirsch, 1996, 1997; Kirsch et al., 2002) through the use of the economic theory of complementarities (*see* Milgrom and Roberts, 1990, 1994, 1995). They explored the limitation of a portfolio of controls that were hypothesized to be used in a singular fashion when complex projects demanded the use of multiple techniques simultaneously. By examining the risks and controls associated with ERP system implementations and developing critical success factors that when used together enhanced the outcomes, they found that all the factors were necessary, and that no one factor by itself was sufficient for a successful implementation.

Based upon a survey of organisations that implemented ERP systems, they were able to aggregate the specific individual factors identified in the prior research into five over-arching factors:

- project management;
- change management;
- alignment of the business with the information system;
- oversight (internal audit) activities; and
- consultant and planning activities.

Numerous controls exist within each of the five over-arching categories (and some controls applied across categories, consistent with the theory of complementarity). From this work, the complexities associated with successful ERP implementations can be seen and missing processes can be identified in what appear on the surface to be well-executed implementations which have failed.

3. ERP FAILURE FACTORS

Aloini et al. (2007) carried out a meta analysis of published research in 1999 and concluded that there are four broad categories of ERP system failure:

1. **Process failure**, when the project is not completed within the time and budget.

2. **Expectation failure**, when the IT systems do not match user expectations.
3. **Interaction failure**, when users attitudes towards IT are negative.
4. **Correspondence failure**, when there is no match between IT systems and the planned objectives.

In the course of their analysis, they identified 19 risk factors. Their factors are consistent with those identified by Grabski and Leech (2007) and include: inadequate selection of the ERP project to adopt, low key user involvement, inadequate training and instruction, inadequate business process re-engineering, and ineffective consulting services.

Elsewhere, ERP user groups, such as ERP-SELECT in 2004 (<http://erp.ittoolbox.com/groups/vendor-selection/erp-select/eraselect-erp-for-university-587056>) have offered lists of the factors that may lead to failure of ERP implementations:

- Education (not understanding what the new 'system' is designed to achieve)
- Lack of top management commitment (management being involved but not dedicated)
- Inadequate requirements definition (current processes are not adequately addressed)
- Poor ERP package selection (the package does not address the basic business functions of the client)
- Inadequate resources employed by the client
- Internal resistance to changing the 'old' processes
- A poor fit between the software and users procedures
- Unrealistic expectations of the Benefits and the ROI
- Inadequate training (users do not properly how to use the new tool)
- Unrealistic time frame expectations
- A bottom up approach is employed (the process is not viewed as a top management priority)
- The client does not properly address and plan for the expenses involved

4. IMPACTS OF ERP IMPLEMENTATIONS UPON MANAGEMENT ACCOUNTING AND UPON MANAGEMENT ACCOUNTANTS

Research on the effects of ERP systems on management accounting [e.g. Booth et al. 2000; Maccarone, 2000; Granlund and Malmi, 2002; Granlund and Mouritsen, 2003; Caglio, 2003; Hyyon, 2003; Lodh and Gaffikin, 2003; Quattrone and Hopper 2003; Scapens and Jazayeri, 2003] suggests that ERP systems have little impact on management accounting, but that the management accountant is evolving into a business consultant (Caglio 2003; Rom and Rohde 2004). This is consistent with the theoretical stance on the role of the accounting in an events-based system environment as first presented by Denna et al. (1993, p. 16) and further developed by Hollander et al. (1996, p. 14).

Granlund and Malmi (2002) conducted a field study of 10 companies in Finland in which they examined the effect of integrated enterprise wide information systems on management accounting and the work of management accountants. They concluded that “... *ERPS projects have led to relatively small changes in management accounting and control techniques*” (p. 299). Booth et al. (2000) found similar results, as did Rom and Rohde (2004), who concluded that Strategic Enterprise Management (SEM) systems had a positive impact on management accounting practices whereas ERP systems only had a positive impact on transactional management accounting (e.g., data collection).

Scapens and Jazayeri (2003) found that under ERP there was no fundamental change in the nature of management accounting information. However, there were changes in the role of management accountants compared with those in traditional accounting environments:

- ▽ ERP systems reduced the routine work undertaken by accountants and led to the routinisation of accounting through evolutionary change.
- ▽ Management accountants and managers found new ways of working with the ERP system, each performing different tasks than before, e.g.
 - operating managers can access the information themselves from the ERP system rather than waiting for the accounting report; and,
 - management accountants perform more analysis of results than before.

Fahy (2000) also explored the implications of SEM software for management accounting and control activities. He concluded that “*SAP, Peoplesoft and ERP vendors appear to view SEM essentially as a technological issue rather than a management/decision support issue*”; and “*While SEM technologies will remain largely the domain of established enterprise systems vendors the successful implementation of SEM will require a much richer understanding of the nature of strategic management and an understanding of the decision support process.*”

Brignall and Ballantine (2004) looked at linking SEM, Performance Measurement and Management (PMM) and Organisational Change Programmes (which could include ERP implementations). While they agreed with Fahy (2000) that SEM implementations were generally treated as technology projects, they found that successful adoption requires a broad perspective including recognition of the needs of the organisation. This is consistent with the requirement of a strategic perspective for the implementation of an ERP system, a necessary but not sufficient condition for a successful implementation (Grabski et al. 2001).

Both Fahy (2000) and Granlund and Malmi (2002) suggest that further research is required to provide a richer understanding of the use of ERP systems and related SEM technologies in management accounting, strategic management and decision support. Further evidence of the need for a comprehensive research study is provided by Fearon (2000) who concluded that “... *the majority of Canadian companies today continue to use the most cumbersome and uncollaborative tool for enterprise budgeting – the commercial spreadsheet.*” He urged the integration of the budgeting system with the integrated ERP system. Further, an ERP system is seen as the basis for a successful

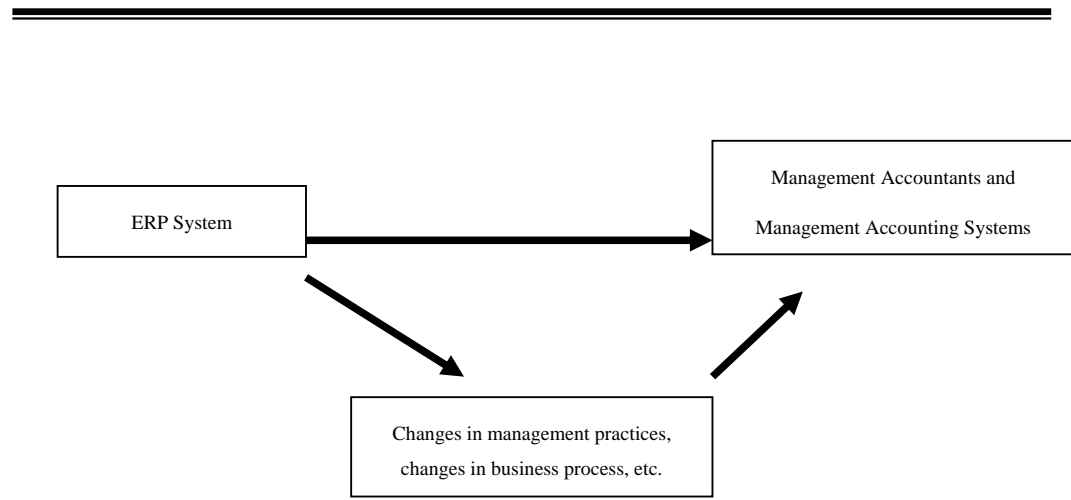
balanced scorecard approach (Edwards 2001). The balanced scorecard, with data obtained from the ERP system provides management with visibility into the business units and the ability to monitor progress against the overall organisation plan.

Wallace and Kremzar (2001) suggest that the two critically important objectives for ERP system implementations are fact transfer and behaviour change. Examples given of fact transfer relevant to management accounting include, “*when the cost accounting manager learns about ERP’s extremely high requirements for inventory record accuracy*” (p.138). An example of behaviour change is “*when the manager leads the charge to eliminate the annual physical inventory, because he or she knows that inventory records sufficiently accurate for successful ERP are more than accurate for balance sheet valuation – and that physical inventory cost time and money but often degrade inventory accuracy*” (p.138). These examples provide some insight into the impacts that ERP systems may have upon management accountants.

A model of the impact of ERP systems on management accounting and management accountants was developed by Granlund and Malmi (2002) – see Figure 1. They proposed that ERP systems have both a direct and indirect effect on management accountants and management accounting systems. Examples of direct effects are changes in report content, timing, scheduling, etc. that are caused by the ERP system. Indirect effects result from changed management practices, changes in business processes, etc. that are initiated by the ERP implementation.

Figure 1

Impact of ERP Systems on Management Accountants and Management Accounting



Source: Granlund and Malmi (2002)

Implementation Success

One element not identified in this model is the success of the ERP implementation. If an ERP system implementation is successful, the focus of the organisation changes from a functional orientation to a process orientation (Davenport, 2000; Wallace and Kremzar, 2001). Doing so requires a change in the management and accounts reporting structure; a change in the generation of reports (since all data are now obtained from a centralised database); and a requirement for communication across functional areas. Since management accountants no longer need to generate the 'ordinary' reports, they can provide value for the organisation through the generation of forward-looking reports and improved analyses of business options. This is similar to what Caglio (2003) referred to as the "*hybridisation*" of management accountants.

A less successful ERP project might increase their activity on some of their existing tasks, absorbing any time saved through their being required to spend less time on other tasks, leaving no time for them to develop into business consultants.

It is inconceivable that the success or failure of an ERP implementation has no impact on those involved, or upon the tasks that individuals perform.

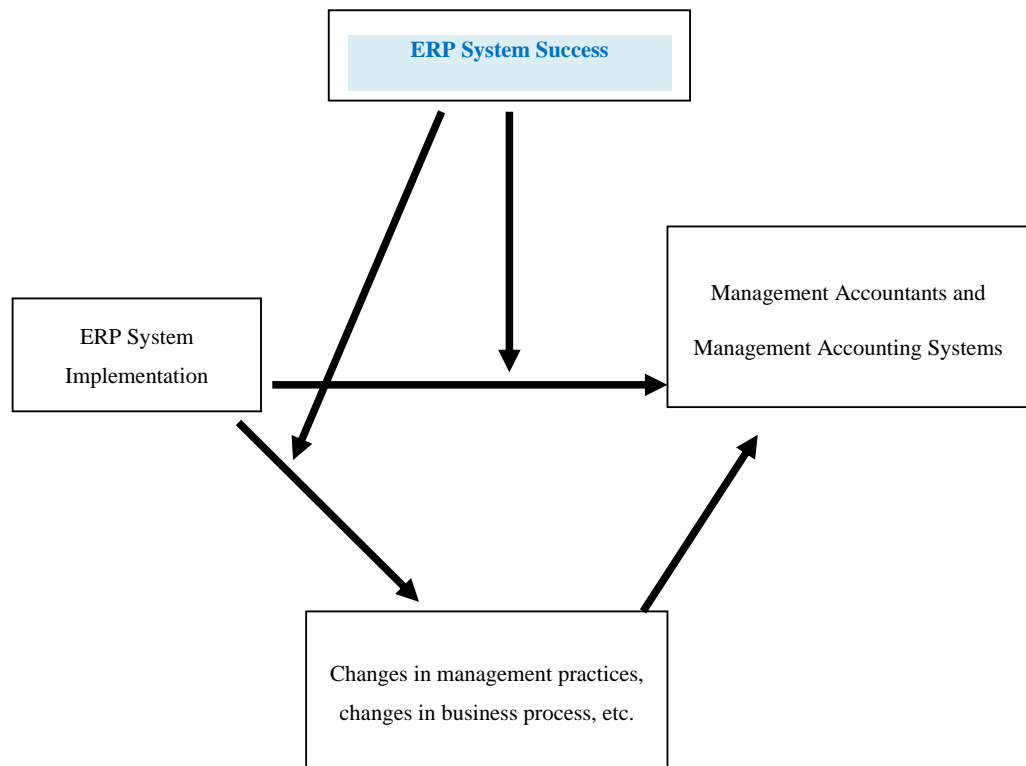
Recognising the likely relevance of implementation success, Grabski et al. (2009) used a case study approach to examine the changes in management accounting and in the role of management accountants resulting from the implementation of ERP packages in seven large organisations based in the UK. In addition, they explored the effect that implementation success or failure had on the changes that occurred. The study found that in all seven case studies, the role of the management accountants was affected and that the changes in the role were related to the success of the system implementation:

- ▽ the more successful implementations resulted in dramatic changes to the nature of their role whereby the management accountant became a business advisor who took proactive steps to aid the various executives and decision makers;
- ▽ in the less successful implementations there was a dysfunctional impact upon the management accountants even where the tasks they were expected to perform had not changed.

In the light of these findings, Grabski et al. amended Granlund and Malmi's (2002) model to include the success of the ERP implementation, as shown in Figure 2.

Figure 2

Impact of ERP Systems on Management Accountants and Management Accounting



Source: Grabski et al. (2009)

The research reported in this paper takes this model and seeks to identify whether the findings as reported by Grabski et al. (2009) can be generalised beyond the seven organisations whose ERP implementations they had studied. It does so by endeavouring to answer two research questions:

Research Question 1: How does the role of management accountants change when an ERP system is implemented?

Research Question 2: Is there a relationship between the changes experienced in the role of management accountants and the level of success of the ERP implementation?

5. RESEARCH METHODOLOGY

A questionnaire was developed based upon the findings of Grabski et al. (2009) and informed by the extant literature. It was pre-tested and revised to eliminate ambiguity. Seven hundred and ninety questionnaires were sent to CIMA members working in large organisations and to attendees of CIMA sponsored seminars related to enterprise systems, of which 122 were returned as “not known/gone away”. Of the remaining 668 questionnaires, 92 responses were received, a response rate of 13.8%. This response rate is equivalent to or slightly better than the response rates reported in other recent studies (Mabert et al. 2003, Jones and Young 2006). Of the 92 responses, two-thirds (62) reported having implemented an ERP system. The analysis contained in this paper is based upon those 62 responses.

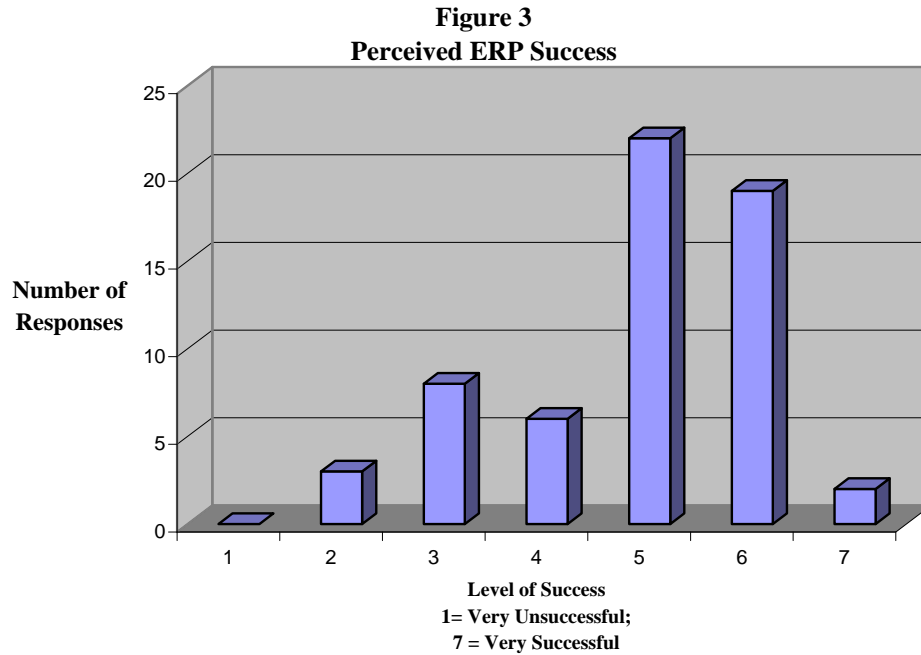
6. FINDINGS

Among the respondents, *SAP* was the dominant vendor. In several cases, multiple ERP packages were in use (generally *PeopleSoft* for Human Relations and some other package, such as *Oracle*, *SAP* for financials or whatever function was supported by that ERP package). A small number of respondents indicated that they used a smaller ERP vendor's package (e.g., *GEAC*). Sixty-seven percent had implemented Financials modules, 34% had implemented Manufacturing modules (this total includes both manufacturing and non-manufacturing organisations), 37% had implemented Human Resources modules, and 15% indicated they had implemented some other ERP modules.

Implementation Success

The questionnaire asked respondents to indicate whether, in their opinion, the ERP system has been a success² on a scale from 1 (Very unsuccessful) to 7 (Very successful) with 4 indicating ‘neutral’. There were no responses of ‘1’. The mean average score was 4.94 (median 5.00) indicating that the ERP implementations were, on average, considered to have been successful. Figure 3 presents the distribution of scores. The respondents were also asked how senior management perceived the success of the ERP implementation. A paired t-test found no significant difference between the perception of the respondents and their perception of the view of senior management (N=62, $t = -.533$; $p < .596$).

² As objective measures of ERP system success are generally not available, perceived success was used: business managers (including IT executives, management accountants, and auditors) are generally able to provide an indication of the system's relative success. To illustrate, if no-one can obtain the needed information to run the business, they will know this and state that the ERP system is not successful. If they can obtain in-depth reports cutting across functional areas in a real-time basis, and have real-time information on inventory and production levels, they will state that the ERP system is successful. Hard metrics are not required for this assessment.



Impact of ERP on Operational Factors

The respondents were also asked to indicate the impact of the ERP system on a variety of operational factors. A seven-point scale was used anchored at 1 = Significant Adverse Effect and 7 = Significant Improvement (Table 1). **There was a modest positive effect of the ERP system on all of the listed items, with the largest improvement being in the quality of information/data.** The ERP system was also associated with improved decision-making, which was likely to have been a result of the improved information quality. Given that almost 20% of respondents viewed their company's ERP implementation as a failure, these levels of improvement are likely to be understated if only successful implementations are considered.

Table 1: ERP System Impact on Operational Factors	
Item	Mean
Information/Data Quality in General	5.47
Decision-Making	5.12
Cross-site Benchmarking	5.04
Order Management & Cycle Times	5.04
Planning	5.00
Cash Management	4.75
On-Time Delivery	4.73
Inventory Turnaround Time	4.66
Inventory Levels	4.62
Productivity	4.57
Overall Operation Costs	4.50

Impact of ERP on the Role of the Management Accountant

If an organisation successfully implements an ERP system, that system should support the core organisational activities. Further, since an ERP system is an integrated system, rather than a system built around separate functional areas, better information sharing should exist with more timely information and reduced time being spent on data collection by the management accountants. From the literature, in these circumstances, management accountants should have more time for data analysis and performance and control issues; and time to produce a wider range of reports than previously. To test whether this was the case, the questionnaire included questions about:

1. the ERP system support of core processes (**Independent Variable 1**);
2. whether there was an improvement/delay resulting from the ERP system (**Independent Variable 2**); and,
3. the impact the ERP system had on the management accountants with respect to time spent on
 - (i) data collection (**Independent Variable 3**);
 - (ii) data analysis (**Independent Variable 4**); and,
 - (iii) internal reporting (**Independent Variable 5**).

The responses to (IV1) the core support and (IV2) timely information questions were measured on 7-point scales ranging from 1 (not at all – significant delays incurred) and 7 (supports all – significant improvement). The responses to the three impact on management accountants questions (IVs 3, 4, and 5) were measured on a 7-point scale ranging from 1 (very much reduced) to 7 (very much increased).

Regression analysis was performed on the responses to these questions, with ERP success as the Dependent Variable and the other five items as the Independent Variables. The regression was significant ($p < .001$; adjusted R-square of .484). Further analysis revealed that:

- ∇ The time spent on data analysis ($p < .325$) and the focus on internal reporting ($p < .869$) were not significantly related to perceived ERP success. There was a slight decrease in both the time spent on data analysis (mean of 4.67) and internal reporting (mean of 4.75) regardless of the perceived ERP system success.
- ∇ two of the five independent variables were positively related to ERP success while one was negatively related:
 - (1) Support of core organisational activities ($p < .006$) and (2) More timely information ($p < .026$) were positively related to ERP success. **An ERP system is perceived as more successful if it supports the core business processes and provides more timely information.**
 - The Amount of time the management accountant spent on data collection was negatively related to perceived ERP success ($p < .080$). **In successful ERP systems, the time spent by management accountants has significantly decreased.**

The respondents were asked about the overall impact of the ERP system on both (a) management accounting in general and on (b) the role of the management accountant in particular. A seven-point scale was used with 1 representing 'significant negative impact' and 7 representing 'significant positive impact'. Regression analysis was conducted with the level of ERP success as the dependent variable and impact on management accounting in general and impact on the role of management accountant as the independent variables.

The overall regression was significant ($p < .001$, Adjusted R square of 0.284). However, while **the perceived ERP system success was significantly related to the role of the management accountant** ($p < .008$, mean = 5.02), **it was not significantly related to management accounting in general** ($p < .711$, mean = 5.13). These results indicate that implementation of an ERP system is neutrally related to management accounting in general, regardless of the success of the implementation. It should be noted that the mean response of 5.13 indicates that **there is a positive impact on management accounting in general regardless of the level of perceived ERP system success**. However, the impact on the management accountant's role depends upon whether the ERP implementation was a success. **If the ERP system was a success, the role was improved, while there was a negative impact if the implementation was not a success.**

A similar picture was found when examining the proportion of reports that were formerly generated by the management accountants that were now automatically generated by the ERP system. Regression analysis indicated that there was a significant relationship ($p < .065$) between the level of perceived ERP system success and the proportion of reports now generated by the ERP system. **The greater the level of success of the implementation, the greater the proportion of the reports that were previously prepared by the management accountants that were now produced by the ERP system.**

Skill Sets of Management Accountants

The respondents were also asked to indicate the changes in the skill set

management accountants need in an ERP environment, relative to a non-ERP environment (Table 2). A seven-point scale was used (anchored at 1 = much less, 4 = no change and 7 = much more). **Software skills, cross-functional working relationships and analytical skills all were rated at 5 or above, indicating at least a moderate increase required in those skills in an ERP environment.** None of these skills was viewed as being less required in an ERP environment.

Table 2: Skills Needed in an ERP Environment	
Software skills	5.23
Cross functional working relationships	5.13
Analytical skills	5.00
Consulting Skills/DSS	4.98
Broad Based Business knowledge	4.70
Interpersonal skills	4.70
Educator skills	4.67
Project management skills	4.61
Patience	4.58
Leadership skills	4.56
Project focused	4.37
Time management skills	4.34
Accounting Skills	4.11
Work management skills	4.10

The questionnaire also investigated whether there was any relationship between the skill ratings and the level of perceived ERP success. In a regression with ERP success as the dependent variable and the skills as the independent variables, a significant regression ($p < .021$) was obtained (adjusted R square of .272). **Consulting skills was marginally significant ($p < .101$) and positively related to ERP success,** while software skills ($p < .031$), patience ($p < .006$) and leadership skills ($p < .058$) were all significantly negatively related to ERP success. **With a less successful project you need more patience, software and leadership skills.** This does seem reasonable: the management accountants will need to provide additional leadership, and since everything is falling down all around the management accountants and everyone will want their report yesterday, patience and skills needed to obtain the data and produce the reports are critical for survival.

Other findings

Grabski et al. (2009) found a mixed impact on the number and nature of management accountants post-ERP implementation. Sixteen of the 34 respondents to a question on this topic reported changes in the number of management accountants post-ERP implementation of these 16 respondents, ten indicated a reduction (ranging from 5%-35%) and six an increase (ranging from 5% to 100%).

This supports the findings of Grabski et al. (2009) that a management accountant

in an ERP environment needs a strong understanding of the business (business processes), significant interpersonal skills, leadership skills, decision-making skills, analytical skills, planning skills, and technical skills (including computer and accounting). Management accountants need to be business partners and confidantes of the other managers in the organisation. Those management accountants who do not possess these skills will join the ranks of those found in the case studies that were made redundant or left voluntarily. Organisations which implement an ERP system incur significant costs and are demanding value and a return on everything, including their employees.

7. CONCLUSIONS

These findings support and confirm the findings reported by Grabski et al. (2009). They indicate that ERP implementations results in changes in the tasks of the management accountants, with the quality of many operational factors, such as inventory control, and the overall quality of data and information improving irrespective of the success or failure of the implementation (Research Question 1).

The findings also supported Grabski et al.'s (2009) findings that the degree of change in the role of management accountants was related to the level of success of the ERP implementation (Research Question 2). Under successful ERP implementations, data quality increases, decision-making is improved, and the percentage of reports automatically generated by the (ERP) system is greater than under the previous (traditional-software-based) information systems. Many reports produced automatically by the ERP system or by managers using the ERP system were previously prepared by the management accountants using other software, such as spreadsheets. Consequently, additional time is available to the management accountants to perform other value-adding tasks in place of the mundane reporting tasks they used to perform, opening the way for them to perform the role of Denna et al.'s (1993) business solutions professional.

In conclusion, when an ERP implementation is successful, management accountants have time for other, less mundane activities; and their role becomes more enriching as a result.

When an ERP implementation is unsuccessful, the role of the management accountant increases. Some of the ERP system deficiencies require increased activity on the part of the management accountants without any noticeable reduction in the tasks they traditionally perform. For example, they need to improve their software and leadership skills in order to cope, but have no additional time in which to do so.

Grabski et al. (2009), found that for ERP implementations to be successful, management accountants should be involved from an early stage. The findings of this study take that conclusion further: it is to the benefit of management accountants to ensure that ERP implementations are a success. If it is not, they are likely to find that their workload increases without any alteration to the time in which they have to perform their job. Whether it is a success or a failure, they also need to be prepared for changes in their role which go well beyond simply doing more than before.

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