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THE EFFECT OF ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS ON ACCOUNTING PRACTICES IN COMPANIES IN IRELAND

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ABSTRACT

This study explores the prevalence of Enterprise Resource Planning (ERP) systems in Irish companies and evaluates the effect of ERP system implementation on management accounting's role and practices. An e-mail survey of the largest 1000 Irish Companies was followed by a postal questionnaire of all ERP using companies identified. Results suggest that ERP implementation affected the accounting practices used and suggest that ERP implementation may be seen as a "change enabler" for the introduction of "newer" accounting techniques and practices.

INTRODUCTION

Prior studies point to a growing awareness of the importance of a strategic focus in accounting and that management accountants should understand the need for updated management control systems and techniques (Burns, Ezzamel and Scapens, 1999). It is also acknowledged that the diffusion of IT has been one of the main change drivers in management accounting. Enterprise Resource Planning (ERP) systems are claimed to be 'the current most advanced administrative corporate IT solutions to have emerged' (Granlund and Malmi, 2002, p. 299). It is a relatively new technology, having come to prominence only with the development of client server technology in the last decade, and is one of the fastest growing markets in the software industry. Vendors are promoting the viability of using newer accounting techniques and practices and Decision Support Systems (DSS) in conjunction with ERP systems (Fahy and Lynch, 1999). Although Adam and O'Doherty (2000) have examined how organisations in Ireland have adopted ERP systems, there is little published research in the Irish context about the consequences of ERP implementation on the role of management accounting and on its techniques and practices.

This paper documents an exploratory study into the prevalence of ERP systems in Irish firms and possible links between ERP implementation and changes in accounting practices. It first considers some relevant prior studies with particular reference to the Irish experience. To provide added context for the reader it briefly considers the insights offered by concepts of institutions and routines to developments in accounting practice. This is followed by a description of ERP

systems and their claimed benefits for accounting. The study findings follow, together with discussion and some tentative conclusions.

ADOPTION OF ACCOUNTING PRACTICE CHANGE

There is evidence to suggest that the acknowledged need for a broader strategically aligned approach to the management accounting role has resulted in rather limited change in practice (Pierce and O'Dea, 1998; Burns et al., 1999; Innes, Mitchell and Sinclair, 2000).

Innes et al. (2000) carried out two surveys in 1994 and 1999 on the adoption and use of Activity Based Costing (ABC) in the UK's largest companies. These showed that, despite the strong advocacy of ABC, relatively low rates of adoption had taken place, possibly as low as six per cent. Similar findings resulted from a study on ABC/ABM (Activity Based Management) implementation in large Irish manufacturing firms carried out in 1995 (Clarke, Hill and Stevens, 1999). Only 12 per cent (24) respondents had implemented ABC and Clarke et al. state that 14 per cent of multinational subsidiaries used ABC as against a five per cent adoption rate by indigenous Irish firms, suggesting that outside influences triggered adoption.

Pierce and O'Dea's (1998) survey showed a significant reluctance to adopt new techniques despite their theoretical advantages. Where new techniques were adopted they were used to supplement rather than replace traditional methods. As with the Clarke et al. (1999) study, multinational companies showed a higher usage of the newer techniques and practices than indigenous Irish owned companies.

Pierce and O'Dea (1998) also indicated that Customer Profitability Analysis (CPA) had a higher implementation rate than ABC. They also suggested that there was some evidence to support the criticism that marginal costing, flexible budgets and breakeven analysis were irrelevant in modern organisations.

Pierce (1999, p. 12) states that there is a growing realisation within the profession of management accounting that management accountants need to be seen as 'an integral part of the management team and not merely somewhat detached suppliers of financial information'. However, Clarke, et al. (1999) suggest that in Ireland the realisation of this aspiration has been limited by the marginalisation of managerial accounting by factors on both the demand and supply sides for innovation. For instance, local business tradition has tended to inhibit innovative firms from sharing experiences with competitors. They also cite the lesser role that accounting education plays in fostering innovation in Ireland compared particularly to the USA. Contributing factors include restricted linkage between the business community and educators, the lack of compulsory continuing professional education (CPE) for practicing management accountants and the influence of professional certification examinations on the academic curriculum. Clarke et al. also recognise that education offers scope for the propagation of accounting innovation in Ireland through an emphasis on real world and case research utilising the specific experiential backgrounds of many Irish accounting academics.

THE IMPACT OF INSTITUTIONS AND ROUTINES

In commenting on accounting change, Burns (2000) draws from what he terms 'Old Institutional Economics' theory to explain accounting change. Burns cites Hamilton (1932, p. 584) as defining institutions as 'a way of thought or action of some prevalence and permanence, which is embedded in the habits of a group or the customs of a people'. Routines comprise of programmed or rules-based behaviour, which is grounded in repeatedly following such rules. Over time, routines become increasingly reinforced by tacit knowledge, which individuals acquire through reflexive monitoring of past behaviour. Routines are, therefore, the habits of a group and the components of institutions. This theoretical concept was developed and applied by Burns to suggest how accounting practices can become 'routinised' over time and become embedded in the assumptions and beliefs of an organisation; in other words, they become institutionalised. Accounting change is difficult if existing institutions are not congruent with the proposed new practices. To implement accounting change, consideration must be given to the local institutional context where such change is to take place, particularly at departmental and functional level as well as at the wider organisational and external level. Power and politics play a vital role in facilitating or inhibiting the change process. While recognising that institutions may inhibit change, it must be recognised that they also help to forge change. Burns et al. (1999, p. 29) state that, 'although institutions may create inertia in the change process, they will also shape the nature of the change'. Davenport (1998) suggests that some fast growing organisations have used enterprise systems as a means of exerting management control and imposing uniformity, a way of making everybody fall into line, forcing change. This may help explain both ERP implementation failures and the revolutionary aspects of ERP, where its implementation has been successful.

Boland and O'Leary (1991) contend that practices of management and systems of accounting and control have long been based upon information technologies. Information technology is perceived by practicing management accountants as the most important element driving change (Burns et al., 1999). They particularly identified databases and ERP systems. Other factors considered important were organisational restructuring, new accounting software, customer oriented initiatives and new management styles.

Busco, Riccaboni and Scapens (2001) suggest that the implementation of financial and non-financial metrics requires corporate-wide information systems and thus accounting system change cannot be isolated from the development of information technology. The survey evidence of Clarke et al. (1999) on the perceived problems with adopting and implementing ABC in Irish firms suggested that inadequate computer software ranked as one of the most significant problems. It was cited by 38 per cent of firms that had adopted ABC, but by only eight per cent of those that had considered but not adopted it, suggesting that it emerges as a problem primarily at the systems implementation stage. ERP systems promoters would claim that ERP addresses this difficulty.

ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS

An ERP system may be thought of as an integrated enterprise-wide software package that has a modular structure. These modules (which are multi-site, multi-company and multi-currency) support all key functional areas of an organisation including production and distribution, finance, sales and marketing and human resources, linking front and back office systems (Davenport, 2000b). ERP systems are run over distributed client/server environments. They are built on a relational database that allows tight integration between all the modules and provides a unified interface across an entire organisation. They have been variously described as a business necessity (Davenport, 2000a) and a tool for centralising and integrating all information systems (Adam and O'Doherty, 2000). They have also been described as a corporate nightmare (Bingi, Sharma and Godla, 1999) and an Orwellian dream (Quattrone and Hopper, 2000).

ERP packages are one of the fastest growing markets in the software industry with businesses around the world spending tens of billions of dollars on implementing and upgrading ERP systems (Bingi et al., 1999; Davenport, 1998). The best known ERP vendors are SAP, Oracle, PeopleSoft, Baan and JD Edwards; SAP has the largest market share (Bingi et al., 1999; Hirt and Swanson, 1999).

ERP can be used as a backbone, providing a common language and data pool, to connect diverse information systems in an organisation and can facilitate the elimination of multiple data entry (Davenport, 1998; Adam and O'Doherty, 2000). Real-time information allows the flexibility to react to competitive pressure and market opportunities and streamline management structures, facilitating more democratic decision making (Bingi et al., 1999; Davenport, 2000a).

ERP IMPLEMENTATION AND THE ROLE OF MANAGEMENT ACCOUNTING

There is no shortage of vendors' "hype" extolling the virtues of ERP systems and their revolutionary effect on an implementing organisation. Benefits claimed include:

> **Consistent, Timely Information:** ERP systems have the capability to provide integrated information in 'real time' resulting in improved forecasting (Davenport, 2000b). The consistency of the integrated information provided by the ERP system facilitates internal benchmarking (Scapens, Jazayeri and Scapens, 1998).
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> **Improved Accounting Processes:** Davenport (2000b, p. 209) states that research suggests that prior to ERP implementation management reporting was 'a haphazard and labour intensive process with many handoffs' but ERP imposes greater efficiency and smoother functioning, thereby reducing the cost of information through data rationalisation and consolidation of procedures. Relief from the burden of 'ad hoc' reporting, leaving more time for analysis, and more transparency of transactions contributes to tighter control (Davenport, 2000b; Quattrone and Hopper, 2000). Davenport (2000b) states that this availability of 'real-time information' can lead to daily rather than monthly/quarterly reporting if desired.

Concerns have also been expressed about the impact of advanced integrated information technology on accountants' traditional role by academic writers such as Burns et al. (1999); and Busco et al. (2001). ERP implementation can change the role and tasks of accountants (Quattrone and Hopper, 2000).

Reduced Head Count and Diminution of Power: ERP technology allows managers with minimum accounting knowledge to accomplish tasks that were traditionally the role of accountants. The transfer of traditional accounting roles to production and line managers means that, since these managers are not directly responsible to accountants, there may be blurred lines of responsibility leading to loss of control and fewer accountants (Scapens et al., 1998; Chapman and Chua, 2000). For example, ERP implementation allowed Monsanto to create a shared services centre (SSC) and cut its management accounting personnel from 15 to nine (Davenport, 2000b). Chapman and Chua (2000) state that ERP type technologies allow organisations to 'unbundle' activities into specialist units and that such shared service centres become prime candidates for outsourcing. They cite the management accounting area as one of the largest growth areas in outsourcing activity.

The traditional role of management accountants as the gate keepers of information is also under threat from information systems experts or information specialists (Scapens et al., 1998) and through the decentralisation of data and knowledge across the enterprise (Burns et al., 1999).

Quattrone and Hopper (2000) also provide anecdotal evidence of the problems that the visibility and transparency provided by real-time, dispersed, easily accessible information can create for management accountants of strategic business units (SBUs) of large multinationals. Local managers no longer have the power to control the financial information provided to corporate level. They are still expected to report and interpret the information but they can 'no longer put their own spin on it' (p. 622) since senior management have direct access to the same figures. Scapens et al. (1998) maintain that the diminution of control over delivery of local management accounting information can lead to a lack of locally relevant information or a return to legacy or supplementary local information systems.

BASIS OF THIS STUDY

This study was conducted in two stages. The first stage was conducted by e-mail while the second consisted of a postal survey.

The e-mail survey assessed the uptake of ERP systems in Ireland and the type of system used. In addition, it generated a list of companies with ERP systems to be used for further study.

The postal survey explored three main questions:

1. *What is the breadth of implementation of ERP systems across functional areas?* ERP systems are modular in design and can be implemented incrementally, one or more modules at a time. This question evaluated the breadth of ERP implementation in Irish companies identified in the first stage of the study.

2. *What is the effect, if any, of ERP implementation on the adoption of newer accounting techniques and practices?* This question explored the use of "newer" accounting techniques and practices by companies in Ireland and the possibility of a relationship between ERP implementation and their adoption by comparison with previous accounting studies unrelated to ERP implementation. Prior research has found that, while ERP could not be seen as a driver for the adoption of newer accounting techniques and practices, data provided by the ERP systems does facilitate these practices (Wieder, Booth and Matolcsy, 2000). Non-adoption of "newer" accounting techniques and practices often rests on cost/benefit implications based on perceived complexity, both administrative and technical, and the requirement for new systems capable of continuous generation of activity data. An ERP system is built around relational databases providing a repository for all the transactional data from the various functional areas of the organisation. ERP vendors claim that their products now support new techniques and practices such as ABC, ABM and CPA. The data stored in the database is readily accessible to users throughout the organisation, apparently eliminating the cost/benefit argument against their adoption.

3. *What is the perception of accounting practitioners regarding the effects of ERP implementation on the management accounting role?* Information technology has had a marked impact on the accounting role since the introduction of PCs, spreadsheets, and computerised accounting packages. Practices of management and systems of accounting and control have long been based upon information technologies (Boland and O'Leary, 1991). ERP systems are promoted as being the ultimate management tool, providing complete integration across all functional areas and information in real time and improving processes and increasing efficiency. Financial closings can now be accomplished in a fraction of the time needed prior to ERP implementation. Writers such as Burns et al. (1999) and Busco et al. (2001) have indicated that the consequences of ERP implementation for the traditional role of management accounting could be radical. The purpose of this question is to provide an overview of how accounting practitioners view the impact of ERP implementation on their role.

CONDUCTING THE STUDY

E-mail survey sample

As there was no available database listing ERP systems implemented in Ireland, the 'List of the Top 1000 Irish Companies' published by *Business and Finance Magazine* formed the basis for the e-mail survey sample. Of the 1,000 companies on this list, 770 were listed with e-mail addresses. Financial Controllers were used as the target respondents since they were likely to have the required knowledge and the autonomy to divulge information. Adam and O'Doherty (2000) also showed that, of the 14 companies using ERP in their survey, nine of the ERP

implementation projects had been championed and managed by the Financial Director/Controller/Accountant.

The Internet has its own operating guidelines, colloquially known as 'netiquette'. Unsolicited e-mails are considered a breach of 'netiquette' and an invasion of privacy (Coomber, 1997). To prevent the survey being rejected as junk mail and reduce unwanted intrusion a subject heading clearly outlining the source and the nature of the e-mail was used. The e-mail sought just a very short, simple reply as to whether the organisation used an ERP system and if so what type of system it used. Of the 770 e-mail addresses provided by the Business and Finance list a total of 350 proved undeliverable or invalid.

The e-mail survey was successfully delivered to 420 companies. A response was received from 327 companies, 77 per cent of the deliverable list, or 42 per cent of the complete list (770). This response rate was well above the expected average response rate for e-mail surveys. Sheehan (2001) cites the mean response rate for e-mail surveys as 24 per cent. An added advantage gained from carrying out the e-mail survey was that a contact name within the target company was obtained. This proved useful for carrying out a follow up reminder to the postal questionnaire survey.

The questionnaire postal survey

The list of 153 ERP users generated by the initial e-mail study was used for the postal survey. It provided a 'criterion sample' and eliminated one reason for non-response by participants and supported external validity. A sample questionnaire containing a feedback section on survey design (including length, clarity and completeness) was posted initially to a small random sample of target companies. Organisations surveyed were widely distributed across a broad section of industries in the manufacturing, services and retail/distribution sectors. Statistical analysis was not carried out since it was considered that it would not produce results that are more meaningful given the relatively small sample. Two follow up e-mail reminders were sent and provided a link to a web page where the questionnaire could be completed on line, or returned by post. The questionnaire was limited to 21 questions to facilitate speedy completion and comprised of a number of open, closed and multiple choice type questions. A Likert rating scale was used where appropriate. Open questions were also used to allow for responses in addition to the fixed choices offered. Questions related to accounting techniques in use prior to, and post, ERP implementation used technique categories consistent with prior published research on accounting practices in Ireland.

FINDINGS

Of the 153 respondents to the e-mail survey using ERP, five failed to state what type of ERP system they are using. Over the other 148 using ERP a total of 35 different types of ERP system were identified. The most commonly used systems were SAP (38 per cent of respondents), JD Edwards (eight per cent) and Oracle and

Movex (seven per cent each). The SAP usage was consistent with a claimed world market share of 36 per cent.

Respondent organisations were widely spread across 11 different industries. Most represented were Electronics/Computer (22), Pharmaceutical/Chemicals (20), and Catering/Food/Beverages (14). Approximately 30 per cent were Irish-owned companies and approximately 38 per cent fitted the SME classification. An analysis of the responses showed that users from particular sectors did not tend to cluster around particular package suppliers.

The initial response to the postal survey over a three-week period was 58 (38 per cent). Following the e-mail reminder 12 (eight per cent) late responses were received giving a total response rate of 70 (46 per cent). This was quite satisfactory given the average response rate for postal surveys. Of the 70 responses, two were unusable, stating that they did not have an ERP system, leaving 68 usable responses.

TABLE 1: PARTICIPANT ORGANISATIONS BY SECTOR

Sector	**(n)**	**%**
Manufacturing	48	70.6
Services	15	22.1
Distribution/retail	5	7.3
	68	**100.0**

The respondent firms represent a broad cross section of businesses (**Table 1**). Twenty different industry categories were identified across the manufacturing, services and retail/distribution sectors. Manufacturing is the largest sector represented. This is unsurprising as the survey sample consisted only of companies using an ERP system and the origins of ERP lie in the manufacturing area in Material Requirement Planning (MRP) and Computer Integrated Manufacturing (CIM) systems.

Forty-seven (69 per cent) respondent companies were subsidiaries of foreign multinationals reflecting the high degree of Foreign Direct Investment (FDI) in the Irish Economy. Twenty-two (32 per cent) respondent organisations were subsidiaries of US parents. While the majority of respondents were multinational subsidiaries, 21 (31 per cent) respondent organisations had fewer than 250 employees and a turnover not exceeding €50 million; only four of these smaller organisations were Irish. Twenty-one (31 per cent) respondent organisations were Irish, 18 of which were independent, while three were subsidiaries of Irish parent companies. The geographical spread was over 14 counties with the highest concentration in Dublin and Cork.

Profile of ERP implementation in organisations

TABLE 2: PROFILE OF ERP MODULES IMPLEMENTED IN PARTICIPANT ORGANISATIONS

ERP modules used by respondents	%	(n)	Number of modules	%	(n)
Finance	97.1	66	6	1.5	1
Logistics	73.5	50	5	10.3	7
Production	58.8	40	4	29.4	20
Marketing/Sales	44.1	30	3	29.4	20
Human Resources/Payroll	14.7	10	2	17.6	12
Inventory/Purchasing	8.8	6	1	11.8	8
Quality Control	7.4	5			
Plant Maintenance	5.9	4			
Project Management	2.9	2			
Banking	1.5	1			
Decision Support Systems	1.5	1			
				100	**68**

Results of the survey (**Table 2**) showed that, over the five main functional areas of Finance, Marketing/Sales, Human Resources, Production and Logistics, 11 different ERP modules were used: Finance, Marketing/Sales, HR/Payroll, Production, Logistics, Inventory/Purchasing, Quality Control, Plant Maintenance, Project Management, Banking and Decision Support Systems modules.

Finance, Logistics and Production modules had the highest usage. This is consistent with the findings of an Australian study by Wieder et al. (2000) which showed that ERP solutions were most implemented in the functional areas of financial management and logistics/production, which were considered to be the most important areas of cross-functional integration. Forty-eight (71 per cent) respondents had implemented Finance and Logistics modules and 38 (56 per cent) had implemented Finance and Production modules. Eight (12 per cent) of respondent organisations used only one module; in all eight cases this was the Finance module. Twenty-nine (43 per cent) had implemented all three of the modules: Finance, Logistics and Production.

TABLE 3: ERP SUPPLIER AND TIME SINCE IMPLEMENTATION IN PARTICIPANT ORGANISATIONS

Type of ERP System	%	(n)	Length of Time ERP Implemented	%	(n)
SAP	41.2	28	<12months	10.3	7
Oracle	8.8	6	1–2 years	19.1	13
MFGPRO	7.4	5	2–3 years	30.9	21
JDEdwards	5.9	4	3–5 years	23.5	16
Movex	4.4	3	>5 years	16.2	11
19 other systems	32.3	22			
	100.0	**68**		**100.0**	**68**

Twenty-four different types of ERP system were identified. Consistent with the results of the e-mail survey, the top five ERP vendors were SAP, Oracle, MFGPRO, JD Edwards and Movex. Forty-one per cent of respondents to the postal survey use SAP. This is consistent with the US experience. Four of the respondent organisations used more than one type of ERP system across their organisations. **Table 3** shows the primary ERP system used by each organisation and length of time since implementation.

Over 60 per cent of the firms had implemented ERP within the last three years, and over 83 per cent within five years. Only 16 per cent of implementations were greater than five years. 10 per cent of respondents had implemented in the past 12 months.

Twenty-six (38 per cent) respondents had no plans to implement further ERP modules, 19 (28 per cent) did not know if further modules were planned and 23 (34 per cent) stated that further modules were planned. Seven of those planning to implement further modules stated that these would support the newer accounting techniques and practices and five planned on implementing more than one new module.

ERP support for "newer" accounting techniques and practices

TABLE 4: ERP SUPPORT FOR "NEWER" ACCOUNTING TECHNIQUES AND PRACTICES

Do existing ERP modules support new accounting practices and techniques?	**%**	**(n)**	**Rank**
Activity Based Costing	26.50	18	3
Activity Based Management	11.80	8	9
Benchmarking	17.60	12	6
Balanced Score Card	13.20	9	8
Customer Profitability Analysis	52.90	36	1
Distribution Channel Profitability Analysis	14.70	10	7
Life-Cycle Costing	8.80	6	10
Non-Financial Performance Measures	42.60	29	2
Quality Cost Analysis	22.10	15	4
Target Costing	19.10	13	5

ERP modules may include support for techniques and practices such as: Asset Accounting, Customer Profitability Analysis, ABC, Product Costing, Kanban/JIT, Consumption Based Production Planning (Francalanci, 2001).

Results from this study (**Table 4**) showed that Customer Profitability Analysis, Non-Financial Performance Measures, ABC, Quality Cost Analysis and Target Costing were the top five newer accounting techniques and practices identified by respondents as being supported by their ERP systems. Fifteen (22 per cent) did not select any of the 10 techniques listed in the questionnaire as being supported by their ERP systems. Seven of these had only one or two ERP modules implemented. The variation in results allows the possibility that different users have differing

levels of familiarity with their ERP system capability. This is not surprising given the duration of experience with ERP.

Respondents' perception of effects of ERP implementation on accounting techniques and practices

Over 73 per cent of respondents perceived that the implementation of their ERP system had considerable or some influence on change in the accounting techniques and practices within their organisations (**Table 5**).

TABLE 5: INFLUENCE OF ERP IMPLEMENTATION ON CHANGE IN ACCOUNTING TECHNIQUES AND PRACTICES

Degree of influence	(n)	%
Considerable influence	20	29
Some influence	30	44
Little influence	15	22
No influence	3	5

Comparison of accounting techniques and practices used by participant organisations prior to versus post ERP implementation

Results showed that respondents, generally, had increased the number of accounting techniques and practices used post ERP implementation. The top four practices prior to ERP implementation, Budgeting, Variance Analysis, Standard Costing and Return on Investment, were still dominant post implementation. These practices form part of the traditional core of accounting techniques and practices. While it cannot be stated that ERP implementation drove the adoption of "newer" practices because of the absence of a control group of non-ERP adopters, approximately 73 per cent of respondents perceived that ERP implementation had influenced their accounting techniques and practices. The Australian study carried by Wieder et al. (2000) showed that ERP adopters had a higher adoption rate of "newer" accounting techniques and practices than did non-ERP adopters.

Table 6 shows that the largest increase in usage was in Customer Profitability Analysis, with a 25 per cent increase. Results also show substantial increases in the usage of the Balanced Score Card (BSC), Activity Based Costing, Quality Cost Analysis, Non-financial Performance Measures and Benchmarking. Although four respondents had discontinued a particular traditional metric, there was an overall increase in all practices, both traditional and new, but the increase in newer practices was distinctly higher. Usage of the Balanced Score Card rose by over 16 per cent and usage of Activity Based Costing rose by over 13 per cent. A small number of respondents reported individual usage of 10 additional metrics.

TABLE 6: COMPARISON OF ACCOUNTING TECHNIQUES AND PRACTICES USED PRIOR TO ERP IMPLEMENTATION VERSUS POST IMPLEMENTATION.

Accounting techniques and practices	Used prior to ERP implementation		Used post ERP implementation		Change in usage	
	%	(n)	%	(n)	%	(n)
Budgets	98.5	67	100.0	68	1.5	1
Variance Analysis	80.9	55	89.7	61	8.8	6
Standard Costing	77.9	53	80.9	55	2.9	2
Return on Investment	47.1	32	58.8	40	11.8	8
Overhead Absorption Volume Based	38.2	26	45.6	31	7.4	5
Discounted Cash Flow	38.2	26	45.6	31	7.4	5
Non-financial Performance Measures	38.2	26	50.0	34	11.8	8
Cost Plus Pricing	29.4	20	38.2	26	8.8	6
Breakeven Analysis	29.4	20	36.8	25	7.4	5
Customer Profitability Analysis	29.4	20	54.4	37	25.0	17
Flexible Budgets	26.5	18	36.8	25	10.3	7
Marginal Costing	19.1	13	26.5	18	7.4	5
Quality Cost Analysis	16.2	11	29.4	20	13.2	9
Benchmarking	16.2	11	27.9	19	11.8	8
Activity Based Costing	11.8	8	25.0	17	13.2	9
Distribution Channel Profitability Analysis	11.8	8	20.6	14	8.8	6
Activity Based Management	8.8	6	20.6	14	11.8	8
Target Costing	7.4	5	13.2	9	5.9	4
Balanced Score Card	7.4	5	23.5	16	16.2	11
Life Cycle Costing	1.5	1	5.9	4	4.4	3

Perceptions of influence of ERP implementation on management accounting role

Respondents were asked to specify the effects of ERP implementation on management accounting. In summary, respondents indicated that the provision of centralised, comprehensive information allows more time to be spent on analysis, review and business support rather than on manual processes.

More than 75 per cent of respondents perceived that implementation of their ERP systems had affected the management accounting role.

TABLE 7: RESPONDENTS' PERCEPTION OF WHETHER OR NOT ERP IMPLEMENTATION EFFECTED THE MANAGEMENT ACCOUNTING ROLE.

Effect on Management Accounting Role	%	(n)
Yes	76.5	52
No	22.1	15
Not stated	1.4	1
Total	**100.0**	**68**

These crude percentages were expanded on and illuminated by respondents' additional comments as summarised in **Table 8**.

TABLE 8: ANALYSIS OF RESPONDENTS' COMMENTS ON THE EFFECTS OF ERP IMPLEMENTATION ON THE MANAGEMENT ACCOUNTING ROLE

Beneficial Effects:				
Information	**Reporting**	**Analysis**	**Efficiency**	**Control**
Improved availability and accessibility	Simplified, automated preparation and validation of reports	Improved margin analysis	Less time spent on gathering information allowing more time for analysis and business support	Tighter control due to improved availability of information for management purposes
Improved quantity and quality of information	Shorter cycle time	Greater ease of reconciliation between financial and management accounting	More integration between production/financial and management accounting	More timely management information for improved decision making
More timely and accurate Information	Improved product costing	Concentration on analysis of reports rather than their creation	Improved production scheduling and customer service	Monitoring and control routines decentralised
Valuable physical resource		Standardisation allows for faster and easier analysis	Increase in value-added activities	Greater visibility and traceability
			Improved communication	More focus on non-financial metrics
			Reduced head count	Process centralised
Negative Effects:				
	Loss of understanding of basic accounting techniques	Need for greater analysis to avoid information overload	Limitations of ERP system led to requirement for separate projects on ABC and variances	Information overload
		More time spent on systems issues		

The framework for the analysis used in **Table 8** is based on the natural clusters identified from comments of respondents. The analysis of results showed that the perceived beneficial effects of ERP implementation reported by respondents far outnumbered the reported negative effects. It should be noted that the issues reported in this study may differ from the ERP experiences of other professionals, e.g. the constraints of imposed uniformity referred to by Davenport (1998) are not problematic for accountants.

DISCUSSION

Prevalence and scope of ERP implementation

The findings of the e-mail survey showed that firms in Ireland are adopting ERP in significant numbers. 153 (or approximately 46 per cent) of the 327 respondents had implemented an ERP system and 10 others stated that they planned to do so within the following 18 months. SAP was the most popular ERP system but 34 other types of ERP system were identified with no identifiable clustering of system choice by industry. This may suggest that some firms may be concerned that adoption of the same type of system as its major competitors may lead to loss of distinctiveness or perhaps loss of a potential takeover barrier.

Results of the postal study showed that approximately 38 per cent of respondents fitted an SME profile. Thirty-one per cent of ERP adopters were indigenous Irish owned companies but only six per cent of these were SMEs. This suggests the importance of the role played by ERP systems in managing both larger organisations and geographically dispersed SBUs of multinationals. Consistent with the findings of other studies, finance, production, logistics and marketing/sales were identified as the main functional areas using ERP systems.

Adoption of "newer" accounting techniques and practices

Traditional methods such as Budgeting, Variance Analysis, Standard Costing and ROI were still the most widely used metrics, consistent with previous research which suggests that the key role for new techniques may be in supplementing, as opposed to replacing, older techniques. In fact there was an increase in the usage of all metrics both traditional and "newer" post ERP implementation. This is consistent with respondents' comments that ERP implementation created a need for greater analysis to avoid information overload. The increase in traditional methods was negligible but there appears to be a steady rise in usage of CPA (54.4 per cent), BSC (23.5 per cent), ABC (25 per cent), Quality Cost Analysis (29.4 per cent) and Benchmarking (27.9 per cent) post ERP implementation. Since ERP removed many of the logistical and financial barriers to the pursuit of cost accuracy a higher rate of ABC adoption was expected. When compared to Clarke et al's (1999) survey it would appear that there may have been a significant rise in usage of ABC. Clarke et al's findings showed that only 24 (12 per cent) out of 204 respondents had implemented ABC. This corresponds with the findings of this survey where pre-ERP implementation ABC usage was 11.8 per cent. The findings of the study by Pierce and O'Dea (1998) showed that non-financial performance measures was the most popular of the "newer" practices with CPA a close second followed by the BSC. The current study indicates that the increase in usage of the BSC has been greater than the increase in other non-financial performance measures, which may suggest that firms may now be using the more formal framework of the BSC to coordinate their non-financial performance measures. CPA involves the calculation of costs associated with servicing a particular customer or customer group. If users were to undertake a rigorous calculation of all costs then a commensurate usage of ABC would be expected. As in the Pierce

and O'Dea findings, there did not appear to be a link between usage of CPA and ABC.

Effects of ERP implementation on the management accounting role

Over 76 per cent of respondents perceived that ERP implementation had repercussions on the management accounting role. The perceived beneficial effects included improved information, reporting, analysis, efficiency and control. Negative effects such as information overload, need for extra projects, increased systems issues, extra reporting and loss of understanding of basic accounting techniques were perceived by only a small minority of respondents. Over 70 per cent of respondents held the title of Financial Controller/Financial Accountant and, as prior researchers suggested, may have been the ERP project champions in their organisations. For this reason, respondents may put forward a biased view with regard to the beneficial effects of implementations. The qualitative comments of the respondents, albeit subjective, appear particularly valuable given the restricted linkages and information flows between the business community and accounting educators in Ireland and also the fact that in Ireland 'companies that adopted beneficial changes in their accounting systems were loath to share that information with competing firms' (Clarke et al., 1999, p. 460).

Limitations of the study

Use of a postal survey imposes a restriction in terms of the nature and volume of questions. It does not facilitate follow-up questions to explore potentially interesting areas or apparently inconsistent responses. The sample size of 70 and related lack of statistical analysis limits the generalisability of the study although the response rate of 46 per cent compares quite favourably with other postal surveys. Notwithstanding the limitations, the survey questionnaire included a suitable blend of open and closed questions and succeeded in encouraging many respondents to volunteer useful and insightful information. The majority of participants were professionally qualified Chief Financial Officers. A reasonable level of understanding of traditional management accounting practices and the more prominent 'new' techniques could, therefore, be assumed. On the other hand, since only the Financial Controllers were surveyed, the possibility of data distortion from respondent bias must be recognised. The study was intended only to record the views of those with responsibility for the selection of accounting practices. It was not intended to seek an impartial evaluation of the effects of ERP implementation on the management accounting function. In this context some caution must be applied to interpreting the term "usage" of accounting techniques. The fact that techniques are "in use" in an organisation does not indicate the degree to which the resulting information is utilised in managerial decision making.

Absence of a control group and not knowing how long the respondents have held their current positions may also have had an impact. However, the fact that over 60 per cent of the firms had implemented ERP within the last three years, and over 83 per cent within five years, suggests that this is not a critical weakness,

particularly when combined with evidence suggesting that senior Irish accountants change employer relatively infrequently. In a recent survey of accountants working outside Dublin, 65 per cent of whom were in industry, only 9.7 per cent had changed jobs in the previous 12 months (Premier Recruitment/ICAI, 2004).

FUTURE RESEARCH

One of the major advantages of ERP implementation is the adoption of best practice built into ERP systems, which facilitates improvement in adopters' business processes. If all of the major competitors in an industry adopt the same type of ERP system they will, theoretically, all have identical processes and will need, therefore, to seek an alternative competitive basis. A reason for the wide variety of ERP systems found in this study may be that adopters consciously chose to implement a different type of ERP system to their major competitors in an effort to protect their uniqueness. Further research is needed to explore the links between ERP choice and the expected effects on long-term competitive advantage.

With regard to the repercussions of ERP implementation for the adoption of "newer" accounting techniques and practices, there is an expected time lag between technical and organisational change and accounting alterations. Davenport (2000b) provides anecdotal evidence that suggests that initially organisations concentrate on gaining experience in the workings of their ERP systems. He suggests that the revamping of their metric systems may take considerable time, anything up to seven years, to accomplish. This study showed that only 10 per cent of ERP implementations were over five years old and there was wide variation in understanding of what accounting practices ERP systems were capable of supporting. A replication of this study by future researchers may show increased rates of adoption of "newer" accounting techniques and practices by "older" adopters. Apparent contradictions in the findings where respondents stated that ERP implementation had a "considerable" effect on accounting techniques and practices while reporting "no change" in their accounting techniques and practices post ERP implementation also provide scope for further research. This suggests that the influence of ERP is still a work in progress.

Emerging from the results of this study, the beneficial effects of ERP implementation on the role of management accounting would appear to outweigh, by far, the negative effects. This finding is based on the perceptions of the Financial Controllers who may have been the ERP project champion in their organisations. Future research efforts might explore the perceptions of less senior members of the management accounting team and non-accounting managers.

CONCLUSION

Arising from the current study it cannot be stated that ERP implementation triggered adoption of "newer" accounting techniques and practices but over 70 per cent of respondents did state that ERP implementation had considerable or some influence on change in the accounting techniques and practices in their

organisations. There did appear to be an awareness on the part of respondents of how ERP systems support the "newer" techniques and practices and respondents planning the implementation of future ERP modules did express an intention to implement modules which supported these techniques. It may, therefore, be tentatively concluded that innovation in management accounting can be led by and directed by the technology available and that ERP implementation is a change enabler for the introduction of "newer" accounting techniques and practices.

It may help overcome the reluctance to adopt new techniques previously reported (Pierce and O'Dea, 1998). This can be explained by the fact that ERP implementation inevitably involves a broadly based change programme which helps provide a new institutional context. Burns et al. (1999) would suggest that any programme which disrupts and changes existing organisational practices offers opportunity for new routines and practices to become implanted and embedded. A longitudinal study would be required to identify causal links between ERP implementation and the adoption of new accounting practices but it seems reasonable to infer that ERP systems help in overcoming the barrier to accounting system change of inadequate computer software reported by Clarke et al. (1999). Because Financial Controllers were the target of the study further research is needed to address the issue of how regularly the resulting information is used by managers and to what extent it influences their decisions.

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