



**ON THE INTERFACE BETWEEN ACCOUNTING
AND MODERN INFORMATION TECHNOLOGY**

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TABLE OF CONTENTS

1	INTRODUCTION	5
1.1	Motivation and purpose of the study.....	5
1.2	Theoretical context.....	8
1.3	The literature review	13
2	RESEARCH ON THE RELATIONSHIP BETWEEN ACCOUNTING AND IT.....	15
2.1	Accounting information systems (AIS) studies	15
2.2	Research on the effects of modern IT on management accounting and on the interrelations between the implementation process of new IT and management control.....	21
3	ENABLING AND RESTRICTIVE EFFECTS OF IT DEVELOPMENTS VIS-À-VIS ACCOUNTING AND CONTROL PRACTICE	27
4	ACCOUNTING/MANAGEMENT CONTROL AND ERP SYSTEMS	33
5	DECREASING OR INCREASING COMPLEXITY?	41
6	CONCLUSIONS AND ISSUES OF FUTURE RESEARCH	47
	REFERENCES.....	55
	APPENDIX 1 JOURNALS SPECIFICALLY REVIEWED FOR THE ANALYSIS	65

1 INTRODUCTION

1.1 Motivation and purpose of the study

Developments in IT¹ have been paramount in recent decades supporting far-reaching consequences within and between markets and societies (Castells, 1996; Kallinikos, 2006). The implications of modern information technology (IT) for business are many and emerge in many forms. Integrated IT (internet, groupware, Enterprise Resource Planning Systems; see e.g. Bancroft et al., 1998; Davenport, 1998; Lozinsky, 1998; Deshmukh, 2006) fosters the fact that IT know-how goes increasingly hand in hand with business knowledge. The emergence of e-commerce necessitates wide knowledge of internet-based systems and their functionality among many occupational groups. Working with IT professionals is everyday practice for production, sales and accounting professionals, which again enhances the need to understand sometimes even the “hard core” of modern IT. There are clear signs that certain technologies that are already taken for granted, especially the internet, have and will change the organization and processes of accounting. Yet, we know little about these change mechanisms.

While it seems to be widely acknowledged that IT plays an important role (and increasingly so) in the field of accounting, the relationships between IT and accounting, especially as regards management accounting and control, has been studied relatively little, although the number of studies in the field seems to be increasing. The bold claims in professional publications that IT development has had the single most dramatic impact among various drivers as accounting has been transformed into a knowledge services profession (instead of passive information provision; cf. the recent literature on the changing role of management accountants, e.g. Byrne & Pierce, 2007) have in general been poorly reflected in recent accounting research. Furthermore, the research tradition in the Accounting Information System (AIS) field, concentrating on, for example, transaction processing, data structure modeling, computer fraud and security as well as system development methodologies,

¹ Information technology is in this study used as a general term comprising both technological and informational aspects. The major interest is in the information system aspects, i.e. in how information and communications technology is used to produce business relevant information for decision-making and management control purposes. Due to space limitations, it is impossible to describe the different technologies mentioned in the study in any detail, but the reader will be referred to relevant literature in each case.

seems not to have produced a useful understanding of the interplay between modern IT and accounting/management control (see Granlund & Mouritsen, 2003). Moreover, also the few studies that have examined the accounting – IT interface from a managerial and control perspective seem to have neglected many important IT developments while concentrating on single (sometimes partly outdated) technologies or only on certain aspects of these technologies. On the other hand, these observations are not to be considered as disquieting as those encountered in conferences and workshops indicating a marginalizing attitude towards IT in the accounting context; some accounting scholars presumably consider IT only as an uninteresting addendum to accounting. This perception seems to be reflected in a recent literature review by Efendi et al. (2006). Their analysis of four top-ranked (U.S.) academic accounting journals revealed that articles considering modern IT were practically non-existent in these journals. The study at hand takes issue with this by demonstrating why studying the accounting/control – IT interface is important in its own right. The study thereby subscribes to the conclusion of Dechow & Mouritsen (2005, p.691) that “...control cannot be studied apart from technology and context because one will never get to understand the underlying ‘infrastructure’ – the meeting point of many technologies and many types of control” (see also Lowe, 2004).

Indeed, although a lot has been written about accounting and developments in IT in professional magazines, only few academic research papers have been published on the issue. This applies particularly, if we also try to understand the wider consequences of digitization from a non-technical perspective, contrary to the technical one that is typically adopted in the U.S.-based, mainstream AIS research. In addition, previous studies have ignored many important topics of research in the area as well, such as web invoicing, internet (increasingly self-service) based reporting, the impact of new technology on bookkeeping agencies, and the contemporary possibilities to outsource the whole accounting function.

One reason for this may be that many countries, including the U.S., are slowly following some of these developments and therefore much research concentrates on more traditional technologies such as Electronic Data Interchange (EDI; see Deshmukh, 2006), or on relatively marginal issues from the accounting and management control perspective, such as information systems security. Even books on the general trends of digitization and the knowledge society (e.g. Bhimani, 2003) address the digitization of accounting itself only to a limited extent. There are though studies that have attempted to analyze the impact of, for instance, integrated technology in terms of Enterprise Resource Planning Systems (ERPS) on managerial reporting and control, but they can be considered to have only opened the discussion (e.g.

Granlund & Malmi, 2002; Scapens & Jazayeri, 2003; Dechow & Mouritsen, 2005; Quattrone & Hopper, 2005). Whereas more empirical research is needed in the area, there is also a need for conceptual analysis to facilitate future research in pointing out what are the important issues of today and tomorrow, and how we should try to examine them.

Rom & Rohde (2007) present a literature review – inspiring partly the study at hand – focusing on management accounting and ERP systems with the aim to identify research gaps and opportunities in the field. The gaps they identified appear relevant, especially in technical terms: more research needed on MA techniques in integrated information systems, the promise/peril of integration, and the dispersion of MA around organizations. However, this paper attempts to both expand and deepen the discussion by offering a more comprehensive analysis regarding the technology (not only ERPS), theoretical insight, and the non-technical issues related to the topic.

Based on a literature analysis this study indicates that the accounting academia may have, in general, a limited understanding of the ongoing developments taking currently place in the accounting – information technology interface. This is reflected in the ignorance of modern IT in studies where its connections and effects on practice should obviously have been considered. This applies to both case and quantitative analysis. In the latter case, one pertinent example is that modern IT has rarely been included in contingency theory models contrary to modern production technology, and even if included, the concept has been operationalized in a very simplistic, technical manner. This appears peculiar considering the important role IT plays in the process of producing managerially useful information to decision-makers.

It is argued that this, altogether, may have important implications regarding research results, as well as the usefulness of knowledge and theories we want to hold out to various stakeholders: researchers, students, and practitioners. However, as Chapman (2005) points out, we should not study new technologies simply because they are new, but because we can learn about established accounting issues by studying these new phenomena. The purpose of the study is to analyze and evaluate research on the interface between accounting/management control and IT, and initiate discussion on how we should proceed as an academic community in order to better understand this relationship and changes occurring in it (cf. Dillard & Burris, 1993). The study ends up in suggesting some avenues for future research in order to develop relevant knowledge and theories of accounting and management control in contemporary IT environments. The motivation for this purpose is in the first hand the mentioned knowledge gap regarding the interfaces of accounting and IT. Theoretically, this gap can be considered significant for reasons explicated

later on: essentially, it is important because accounting and IT seem to be mutually constitutive (Dechow et al., 2007a, b).

This study demonstrates both enabling and restrictive effects IT developments have had on accounting and control practice. It particularly discusses the transforming potential of modern IT vis-à-vis the domains of accounting, the complex intertwining of integrated IT with accounting and control, and the paradox of IT complexity and its manifestations in the accounting domain. Although the developments in IT affecting accounting are described with a broad scope, the focus will be on management accounting and control effects, as those seem to be the most complex, penetrating and unpredictable ones in this context, yet examined to a very limited extent in AIS and other IT related accounting research (Sutton, 2005, 2006). Therefore, this study is not so interested in the digitization of invoicing processes, for instance, as that seems to be an unavoidable automating project without effect on the management of organizations, even if having a considerable, even massive effect on certain administrative processes and their costs. However, this is not to say that management accounting research should not follow IT developments surrounding other domains of accounting, because in information systems financial and management accounting concerns are often intertwined.

1.2 Theoretical context

The purpose of this section is to point out the more general, theoretical concerns involved with the topic of the study. The following discussion aims to introduce theoretical arguments that point out the many important roles IT may play now and perhaps increasingly in the future in accounting and other management control processes. These roles may take forms ranging from “concrete” efficiency enhancing to more abstract mediating role. The emphasis in the following discussion is on the latter end of the continuum that extends the view embedded in the dominating (economics-based) positivistic paradigm in accounting and information systems science (ISS) that IT innovations are implemented and used merely to improve efficiency with regard to task, functional or organizational level performance.

In the most advanced societies, many organizations have already entered the era of digitized² accounting practice (Castells, 2001; Castells & Himanen, 2002). Characteristic to this is that also in the current world – labeled by globalization, various applications of internet technology, and emphasis on

² Digitization parallels in this study electrization and computerization. Central to digitization is the application of internet technology, enabling easy and cheap global communication.

intangible assets – technological innovations will constantly appear and fade away: technology is perhaps never "ready" (Castells, 1996; Palvia et al., 1996; Moschella, 1997; Willcocks et al., 1997; Kallinikos, 2006). There will always emerge new empowering technologies, but which – due to their fragility, partiality, and temporality – will ultimately be replaced by new ones (Giddens, 1990; Jones and Dugdale, 2002). This applies to those technologies currently in use and deserving a lot of attention, such as ERPS technology, too. However, to be able to understand the emerging technologies and anticipate their ramifications for accounting systems, we first need to understand the effects of current technologies (cf. Hopwood, 1987). In addition, there will always be important general lessons to learn from the analyses of contemporary technologies. Many of such lessons are likely to hold also, when new technologies replace the current ones.

Whilst we could think of digitization implying a “juggernaut effect” (Giddens, 1990; see also Ciborra, 2000), it obviously has an empowering effect as well. However, trust in the new technology – helping us to cope with current risks by enhancing the performance of such expert systems as accounting – may lead to new risks, possibly in the systems themselves (Giddens, 1990; Hanseth et al., 2001). What these risks may be are yet largely unknown or unproven. We can though assume that if IT is seen as a modeling tool for how operative and strategic processes should be carried out, it has the power to affect what firms can do in practice (Dechow et al., 2007a, b). Through modeling, translations in ideas and vocabularies may take place: IT may confuse the relations between managerial plans and realized outcomes. Depending on how implemented, IT can also produce constrained images of (economic) reality. Then, again, the role of managers and other experts becomes increasingly important in interpreting the new information that in principle has no limits regarding volume.

IT has become an essential carrier of accounting information especially in the global knowledge society. The analysis of ERP and management control system diffusion in global companies is important (e.g. Quattrone & Hopper, 2005), as these firms frequently exercise concept-packaging standardization techniques when acquiring new subsidiaries, and implementing IT and control systems into them. As Hyvönen et al. (2006) demonstrate, IT is today among the most important carriers of accounting systems and information. By drawing on Giddens’ (1990, 1991) ideas regarding disembedding and reembedding of expert systems (see also Jones & Dugdale, 2002) they show how modern IT in the form of package software enables disembedding of expert systems (including the IT itself) and transporting and reembedding them into other locales (cf. Schulze & Boland, 2000). In their case study, IT emerged to be the core reason for why a management accounting system may

become shaped: standardized, localized and disseminated in an organization. Hyvönen et al. (2006) also show how such expert systems – partly because they are embedded in standard software packages – may easily become unquestionable and unchallenged. This is an important observation and related to the arguments of the study at hand: IT may have many notable consequences regarding management control practice, some of them realized unintentionally. Accounting logic may become sedimented in a complex IT solution and so become difficult to change, as nobody may be willing to question and open a technically working solution for discussion. Even smallish changes may be difficult to implement under such conditions.

These analyses are not far from the ideas of Latour (1987, 1993) and other proponents of the actor-network theory (ANT) and its different applications (see e.g. Callon, 1991; see also Knorr-Cetina & Cicourel, 1981; Law, 1991). These authors suggest that it is networks of human and non-human actors that facilitate or constrain the emergence and diffusion of innovations: nothing happens outside networks; even the existence of innovations is impossible without networks where they are embedded. This would suggest that IT might take a kind of actorhood as well (Dechow & Mouritsen, 2005; Quattrone & Hopper, 2005, 2006; see also Granlund & Malmi, 2002, p. 303-305).³ Being a non-human actor in the organizational and inter-organizational networks facilitating and constraining information flows and thereby decision-making and management control. information technology has the power to affect many organizational practices. For example, this effect may be considerable regarding the design and diffusion of control system innovations. Overall, this is an important issue in this context as it points to the myriad of different actors that take part in the shaping of modern accounting systems and their IT solutions, and are themselves affected by such developments: stakeholders inside and outside (especially software vendors and implementation consultants) the organization, technologies, machines, and systems (Briers & Chua, 2001; Jones and Dugdale, 2002; Quattrone & Hopper, 2005).

Furthermore, computer software has been claimed to play a significant role in black-boxing management accounting technology (Jones and Dugdale, 2002). This study will demonstrate that software is not only a way to give a face to a budgeting system, for example. The partnerships created between consultancy houses, software vendors and their customers in implementation projects have many implications for the implementation of accounting

³ Quattrone & Hopper (2006) present an insightful analysis of the ontology of IT based on ANT. They discuss the paradox of homogeneity and heterogeneity co-existing in IT infrastructures and further theorize on ERP's 'absent presence' in different contexts: issues around the ERP were discussed even if they were only vague ideas of reality, or managers discussed features and virtues of the ERP system even if it was not even in use yet. They conclude that the definition of IT is neither stable nor singular across time and space, which enables IT to travel across organizations.

controls, for the accounting personnel at the individual level, and for accounting as a function. The tensions emerging between the implementation consultants and their customers are interesting (though seldom analyzed) not only in how they shape the IT implementation process (Orlikowski, 1991; Quattrone & Hopper, 2005) but also in how they elaborate control structures and systems as a network, as suggested by research leaning on actor-network theory.

Another perspective for the examination of the economic and institutional environment – including factors mentioned above such as the influence of alliances and networks of consulting and software firms – and the drivers of accounting practice is that provided by (new) institutional theory and its applications (DiMaggio and Powell, 1983; Granlund and Lukka, 1998a). Actually, the impacts of such factors have been addressed in earlier studies to a very limited extent, despite Granlund & Lukka's (1998a, p.170) early remark (see also Lowe, 2004): [...] along with (enterprise-wide) software package development, the design of corporate information systems has become more important and dominating in management accounting practices in general. The important implication of this development is that the converging system designs and ideas are dictating much of the daily management accounting practices around the world.⁴

The role of IT (and related consulting industry) driving accounting practice can also be considered from the homogeneity vs. heterogeneity perspective (Granlund & Lukka, 1998a). While it tends to be generally acknowledged that IT developments drive global homogenization of accounting practices at least at the macro level, we still seem to have little knowledge of whether this truly is the case and if so then to what extent and where: does homogenization in practices occur and to what extent at the micro-level too; does integrated technology crowd out informal systems (Chapman & Chua, 2003); in what sense and to what extent does homogenization take place in management accounting logic, management control in general, in accounting processes (working methods), and in the organization and roles of the accounting function and accountants.

We can hypothesize that integrated technology (ERPS especially) drives homogeneity in practices, at least as their underlying management philosophy is considered. Spreading of best practices embedded in the systems (best according to software vendors, at least; see Quattrone & Hopper, 2005) and through in-built benchmarking should explicitly drive homogeneity and standardization. It is also a fact that as the number of ERP systems sold is enormous, similar solutions are adopted globally with minor or no variation. A

⁴ Granlund & Lukka (1998a) focused their analysis on the macro level. Thereby their analysis did not address – even if it acknowledged – the daily operations at the micro-level and the changes that may take place there due to IT developments (cf. Dechow & Mouritsen, 2005).

different question is whether the same technology means exactly same calculation procedures, for instance. It may also be that as companies want to implement a certain method, e.g. Activity-Based Costing (ABC), the IT platform they have employed forces them to do it in different ways. Besides, practice has shown that all ERPS implementations are different even if the software package would be the same. As Quattrone & Hopper (2005) show, the mantra of integration does not mean same things for all companies implementing ERPS: an integration project may as well lead to the preserving of functional barriers and hierarchical control than to their breakdown. The promise of global process-oriented integration and control may thus remain unrealized, or it is mobilized only as a taken-for-granted notion in the public annual report (Granlund et al., 1998). Such ostensible changes decoupled from action are widely discussed in studies informed by the various genres of institutional theory (see e.g. Carruthers, 1995).

While IT is only one factor among others influencing the formation of accounting and control practices, it seems to be a powerful one (Siegel & Sorensen, 1999; Jacobs, 2005; Byrne & Pierce, 2007); sometimes perceived as the most important single driver of recent developments in management accounting work. In earlier studies advanced IT has only briefly been mentioned and classified to belong to the economic pressures – as opposed to institutional ones – driving current (management) accounting practices (Granlund and Lukka, 1998a).⁵ Modern IT, especially ERPS, has been suggested to lead to the standardization of data collection format and reporting and to open new opportunities to tailor accounting information to the information needs that emerge in local decision situations. The macro-level result of this development has been suggested to be increasing homogenization of (management) accounting practices within companies. However, the systematic examination of these influences is still at its early stages.

The theoretical aspects discussed above are to be considered as food for thought as we try to develop a relevant research agenda for the future. The purpose here is not to develop these theoretical ideas further as such (cf. Dent, 1991, p.725), even if they are informing the study in a loose vein. Rather, the purpose is to explicate different modes of theorizing regarding the linkages between accounting and IT; particularly modes that go beyond simple arguments giving IT only an efficiency increasing role. Each in their own way, the theoretical ideas tend to argue that IT can be interpreted as an occasion for structuring organizations that both facilitates and constrains action (Orlikowski, 1991, 1992; Giddens, 1979, 1984). This is thought to imply major implications for accounting and management control, not least because

⁵ It is as well justified to suggest that IT is not a driver of the changes at all, but a facilitator and reinforcing factor (Granlund & Malmi, 2002; Scapens & Jazayeri, 2003).

they also suggest that accounting/control and IT are intertwined in complex ways and are mutually constitutive (Dechow et al., 2007a).

1.3 The literature review

The starting point for selecting studies for the analysis was that they appeared in a major journal. A search in the accounting journals included in the Social Science Citation Index revealed that only a few studies where IT has been an explicit concern have been published (notable exceptions are special sections in *Accounting, Organizations and Society* in 2005 and in *European Accounting Review* in 2003). After this, the search was directed towards AIS journals, especially *Information and Organization* and *International Journal of Accounting Information Systems*, and towards journals that are known to have published single articles in recent years on management accounting and IT. Altogether, studies examining the (especially management) accounting – IT interface were searched for in more than 20 journals (incl. major ISS journals; Appendix 1). After reviewing the plethora of research appearing in these journals, some general conclusions were drawn on the traditions and trends of development. Following the style of analysis in Ahrens & Chapman (2006), and in order to present a relatively concise picture of the vast field, some illustrative examples – original and/or in one way or another outstanding contributions – are described and analyzed in more detail in the next section. In addition to pointing out important contributions, special attention is paid to studies considered illustrative of the problems prevailing in the field.

The paper is organized from here on into five sections. The next section will review forms and trends of research literature on the interface between accounting and IT. The purpose is to summarize and evaluate the contribution of earlier research. The following section will analyze how, why and to what extent new IT has affected the accounting domain. The two last sections before the conclusions will analyze in more detail the ramifications of integrated technology for accounting and discuss whether complexity is decreasing or increasing with regard to modern accounting information system architectures. These themes emerged from the literature analysis to represent issues important regarding not only contemporary but also future research in the field.

2 RESEARCH ON THE RELATIONSHIP BETWEEN ACCOUNTING AND IT

This section reviews recent contributions that have examined the accounting – IT relationship. These studies have been classified into two broad categories: i) accounting information systems (AIS) studies, and ii) recent management accounting/control focused studies on the effects of new IT on management accounting and the interrelations between the implementation process of new IT and management control.

2.1 Accounting information systems (AIS) studies

Because the area of AIS is very broad ranging from studies where the major concern is IT (rather than accounting implications) to specific accounting software applications a broad summary accompanied with a more detailed analysis of selected contributions (many times studies that seem to be exceptionally prone to debate) is presented in the following. Such a description will definitely not do justice to this branch of literature. However, the decision is based on the fact that this paper is particularly concerned with management accounting/control implications and therefore a closer look is directed towards the second and only recently emerged literature which explicitly deals with MA/MC issues.

When surveying contemporary topics in information systems research and published studies in generalist Information Systems Science (ISS) research journals, it is striking that accounting information systems are extremely rarely touched upon there (Granlund & Mouritsen, 2003).⁶ This research is often about internet applications, e-business solutions, and telecommunication. Those studies that address accounting do it in a very technical manner and definitely grounding the work on a technical IT/IS perspective. Accounting information system (AIS) researchers study accounting and IT in explicit terms: they operate in the middle ground between the fields of accounting and IS/IT. However, this research tends to concentrate on transaction processing systems, financial accounting ledger systems, auditing systems, and general

⁶ An analysis of articles published in 1994-2007 in *Information Systems Research* and *European Journal of Information Systems*, for example, reveals that among the hundreds of studies only two examine accounting issues or accountants' work (Choe, 2002; Newman & Westrup, 2005).

modeling frameworks (like REA: Resources, Events, Agents; see McCarthy, 1982) while management control issues are seldom there (Sutton, 1992, 2000, 2005, 2006). The accounting-information technology relationship is infrequently elaborated systematically even if some experimental, field and analytical research has analyzed the interrelationship between managerial tasks and AIS design/use. There tends to be a lack of questions such as how technology drives management control logic or how management control problems drive information technology solutions.⁷

One of the major problems from the accounting perspective is that AIS research is seldom interested in or takes as its starting point any substantive (management) accounting issue.⁸ In addition, while going through studies in this area it is difficult to avoid the question: do the authors actually know, or do not they not care, what is currently going on in practice? While they most definitely are in contact with the practice in several ways, somehow this knowledge seems not to be reflected in their research work: they may discuss outdated technologies or describe/measure/model the work of accountants in ways that do not correspond to research evidence on major changes in work practices. These problems constantly point to ask questions about relevance: who should be interested in the results and why? Other accounting academics or IT/ISS academics? What about practitioners?⁹ As will be demonstrated in the following sections, perhaps the most notable thing that seems to be ignored in much AIS research is the fact that most companies nowadays purchase package software and do not develop/program their own solutions. This makes a huge difference from the perspective of accounting and finance staff, who today concentrate on software selection and integration issues rather than technical system design. From this point of view, focus on task characteristics is also partly irrelevant as solutions are not designed starting from specific requirements, but most choices have been pre-made by software vendors. This development seems to raise many questions regarding the relevance of of

⁷ There seems to be some confusion about what is AIS research in the AIS literature itself. Sometimes all research on e.g. Management Information Systems (MIS) and Decision Support Systems (DSS) seems also to count as AIS research. In places AIS seems to parallel with MAS (e.g. Mauldin & Ruchala, 1999, p. 324). The view adopted here is that characteristic of AIS is its explicit connection with IT. On the other hand, some MAS research may have this link while most does not.

⁸ A review of AIS studies presented in the four last (2005-2008) European Accounting Association Conferences, for example, reveals that more than half of the studies presented in 2005-2006 have a clear accounting focus. This is a comforting observation regarding the concerns raised in this paper. However, there seems to be a gap between what is being presented in such conferences and what is published in AIS (and other) journals. Besides, the 2007 and 2008 conferences seem, again, to lack balance in this regard, as most of the AIS papers clearly focus on IT issues.

⁹ Interestingly, *Journal of Emerging Technologies in Accounting* has published during its four-year existence a couple of up-to-date case descriptions of corporate experiences of the use of modern IT in management accounting/control (O'Leary, 2005, 2006). However, these articles are mainly technical descriptions without research objectives and theoretical considerations. Otherwise, they seem to offer valuable case observations facilitating future research designs.

many general information system development models applied in AIS research (O'Leary, 2004).

However, this does not mean that system design would not still start from requirements analysis, but the nature of such analysis has changed towards more strategic and managerial orientation. In addition, the relationships with software vendors and implementation consultants have become to play an enormously important role in accounting and other information system development work. Finally, even if we assumed that system design also includes the choice of package software, the task focus seems unjustified. The same applies to some extent to studies promoting user requirements (e.g. Hunton & Gibson, 1999). The data collected for this study points to the fact that information system development projects start with requirements analysis that is tightly linked to issues of corporate strategy, IT strategy, context, and resources. Therefore, even if the tasks performed by AIS users would in principle be important to consider it is difficult today to agree that they should form the core and starting point of all AIS research. Task characteristics may form a convenient basis for AIS development for auditors or whatever accounting task that is mainly programmable (e.g. calculation of income tax) and deals with standard procedures. However, such standards or specificity can seldom be found in management accounting and reporting on a continual basis. Moreover, even in financial accounting not everything can be computerized, because accounting legislation still contains so many judgmental, rather than mechanistic, standards.

The current study takes in general issue with recent contributions in the field, especially with studies such as Hunton & Gibson (1999), Mauldin & Ruchala (1999) and Arunachalam (2004). Although we can agree with some of the general propositions of these papers – like that technology and organizational influences do not have a temporal ordering but they coexist and evolve simultaneously – there emerge at least as many issues of disagreement. The study at hand argues that these studies seem to have several flaws due to a lack of substantial accounting discussion and probably contact with recent developments in the field making the results at least partly irrelevant with regard to theory and practice. They also clearly demonstrate the US mainstream approach dominating the field, being part of the “rigor over relevance” problem (Malmi & Granlund, 2009). This is reflected, for example, in that while the papers in places seem to develop convenient agendas for future research, they in the end suggest only economic or agency theories to be applied (see Dikolli & Vaysman, 2006; cf. Dillard, 2008). As Mauldin & Ruchala (1999) present a framework for future studies it is extremely important to evaluate such guidance vis-à-vis current developments in practice.

Sutton (1992, 2000, 2004, 2005, 2006) has expressed in several occasions a concern for current and future research in the AIS domain. Indeed, many of his concerns are similar to the ones pointed out in this study. Another issue of course is whether these concerns have echoed any reactions among researchers. The concerns many times relate to the *what* question: what is being examined and why. It is not claimed here that information system security, for example, would not be an important issue to study. The question rather is should we as accounting academics devote resources into studying this issue and should accounting practitioners be especially concerned about this. The view adopted in this study would suggest not. On the other hand, if we talk about capital budgeting related to information systems security investments the situation might be different. So the point is, it would be beneficial to have some direct link to the domain of accounting theory and practice, the latter from the perspective of financial personnel, not (only) IT/IS personnel.

Conceptual and review papers in the area (e.g. Mauldin & Ruchala, 1999) reveal one more notable problem: the focus is on decision making rather than control. Naturally, with the mainstream assumptions implying that decision-making is programmable the aid provided by IT is unproblematic: more efficient calculation power is always welcome. Consequently, also issues of personal computing are in the core of AIS research: how single individuals can benefit from innovations in IT, totally ignoring organizational control issues.

One notable thing frequently omitted in AIS research – though also in some of the research addressed below – is the work occurring outside formal ERP-projects. That is, how technologies are made to work in practice (Dechow & Mouritsen, 2005; Newman & Westrup, 2005); how people (not only accountants) fix problems in formal infrastructures with additional systems and procedures in everyday practice (Dechow et al., 2007b). Considering the aim to develop and test hypotheses with statistical analysis, this ignorance seems natural. The assumption that this methodological choice would lead, as a trade-off of ignoring user variety and informal practice, to relevant statistically generalizable results may prove to be wrong: whilst statistically generalizable, relevance for contemporary theory and practice may be very limited. This also raises the question of how ERP technology is measured as a variable. There is a risk of misspecification if companies are only asked whether they use ERPS. Even information about which modules of the ERPS are in use does not actually tell much about the system in use. This may lead to overly simplified interpretations regarding the relationship between ERPS and its effects on performance, for instance.

Mauldin & Ruchala (1999) apply in places relatively old literature, and even if such technologies as ERPS are mentioned, there is no discussion on

how they may change practices.¹⁰ Furthermore, it seems over-exaggerated to make claims on the importance of task-focused research because it “is increasingly recognized, both in psychology and accounting” (p. 319) and then refer to sources dating back to early 80s or at best early 90s. Reading the arguments presented in Mauldin & Ruchala (1999) and in the literature they cite the most, one cannot avoid the feeling of how would these apply today. There exists a vast management literature emphasizing that it is increasingly difficult to identify “programmable tasks”: situations tend to change constantly – information needs respectively – in the turbulent operating environment, including the public sector. In the contemporary environment, with ambiguous, multiple, and changing goals, people are encouraged to be self-organizing and independent, rather than obedient in their task execution (Hartmann & Vaassen, 2003, 120).¹¹

Then again, studies like Arunachalam (2004) try to analyze recent developments in the area and map their implications for organizational design, or have a very narrow scope where for instance the effects of EDI on order-processing time and learning from this process over time (Anderson & Lanen 2002). Two problems seem to emerge with regard to such studies. First, while correctly pointing out that EDI systems reduce the need to re-key data, reduce clerical errors, enhance inter-organizational transaction exchange and at best demonstrate effects on purchasing, receiving and payment transactions, they are too often silent about more substantive accounting and control implications. Towards the end of the paper by Arunachalam (2004), for example, accounting vanishes totally from the picture and the discussion is mainly about EDI and the effectiveness of its use. Whilst we might think there is an indirect relationship from EDI via changed organizational processes and

¹⁰ On the other hand, much research is published in AIS journals examining the effects of ERPS implementation on firm performance or the problems in the implementation process (Hunton et al., 2003; Nicolaou & Bhattacharya, 2006; Rikhardsson & Kraemmergaard, 2006; Grabski & Leech, 2007). The authors of these studies seem to be very well aware of the practical issues involved with the topic and also produce clearly practice relevant results, even though the results seem often to be contradictory. On the other hand, whilst these pieces may be of interest to the accounting academia, they could have been published in general ISS journals as well, i.e. there is nothing that would relate these studies particularly to accounting. It is a different question and beyond the scope of this paper to discuss should there be and where to draw the line between accounting and non-accounting. The important question here is: how to get readers from different disciplines, i.e. do ISS and accounting academics find these studies in the AIS journals, should they and why?

¹¹ Much of what Mauldin & Ruchala (1999) or Hunton & Gibson (1999) suggest may apply to the auditing domain, for example. However, even there the practice starts increasingly to be about buying special package auditing software, or using the auditing module built in ERP systems into which only company auditors have access. In auditing, IT has formed the ground of data inspection for already a long time. Here the trend has been towards more and more sophisticated solutions, applying today neural network technology and self-organizing maps (e.g. Koskivaara, 2004; Back et al., 2001). ERPS have today own modules for auditors that can be used via internet with retailed rights of use, enabling auditors to follow developments during the whole year, and drill down to e.g. suspicious issues easily, remotely. In the ERPS environment, audit trails are easy to follow as in principle all information is stored in one system. However, in practice this may not always be fully realized because of separate systems besides ERPS.

forms to accounting and control, the study does not truly address these connections but leaves them, as well as issues of power and trust, as issues of future research. How they should be addressed in future studies remains unaddressed.

Second, contrary to what some of these studies seem to claim, EDI is not a new phenomenon. Firms implemented EDI systems already some 30 years ago and in many countries new EDI systems are not implemented any longer. The functions EDI systems serve are today taken care of by ERP systems and other web-based solutions. Therefore, it is ironic to state in year 2004 that EDI is a revolutionary technology. On the other hand, different technologies can be used as examples of how IT in general transforms accounting and control practices. This is how some of the studies should probably have framed the purpose of their study. EDI systems are currently followed and replaced by XML-based (eXtensible Mark-up Language; see Deshmukh, 2006) solutions, but in principle they serve the same purpose. In this sense what we learn from EDI studies is not totally outdated.

In conclusion, AIS research seems to be partly on the right track. Some of the issues are certainly worth studying, like ones regarding importance of group discussion during system development, or the media used to deliver information to users (Hunton & Gibson, 1999; Mauldin & Ruchala, 1999). However, the question can be raised should they be a major concern of the accounting academia and why (cf. Sutton, 1992). More importantly, AIS research seems to be on the right track in claiming that IT allows changes to the organization structure. However, what the accounting and control implications of such changes would be is hardly ever analyzed (see Hartmann & Vaassen, 2003). This is not only a concern raised in this paper but also one acknowledged in the AIS community (Sutton, 2004). AIS researchers possess valuable technical knowledge about advanced technologies (ERPS, neural networks, intelligent systems, etc.) that could potentially be much better harnessed to serve research on substantial accounting issues.

A further conclusion is that even if we in places can agree on the appropriateness of study objectives, certain problems arise with the theory base exclusively leaning on contingency theory, agency theory and transaction cost economics. While providing some valuable insights into the area, they seem to push research into questions and problems that are many times far from the everyday practice of accountants and other producers and users of especially non-standardized accounting information. Most AIS research is empty with regard to power and politics aspects, mediating and moderating performance and other effects flowing from the use of accounting information systems. Perhaps the major problem with these theoretical bases is the overly simplified assumption that the design and implementation of an (management)

accounting system is about choosing certain solutions thereby ignoring the strategic, organizational, institutional and individual factors involved.

Furthermore, the studies simultaneously ignore that today system selection is not about careful design starting from a clean desk but accounting and other personnel may be conditioned by what is available in the adopted enterprise-wide information systems and perhaps better solutions outside that are not allowed (see Hunton & Gibson, 1999). All these concerns potentially have detrimental effects as regards the knowledge we hand out to practitioners and students. Regarding the latter, researchers/teachers should carefully consider what are the core competencies required from graduating students, i.e. future accountants. For example, do they really need to know how REA modeling works, or should they rather know what IT solutions there exist to support the implementation and use of strategic management accounting tools, what are their pros and cons, and how sustainable information systems should be developed in different operating environments?

A good question also is (though beyond the analysis carried out in this paper); do financial and management accounting researchers follow research in the AIS domain and should they? It seems that they do not read or at least cite research published in AIS journals. This may indicate that accounting researchers do not consider the results useful or we can speculate that they are simply ignorant of this branch of literature (or do not care). If the latter is true, then there is a long way to develop truly fruitful cooperation between the different sub-disciplines. The view adopted here suggests that accounting researchers should increasingly follow developments in IT and IS practice and research.

2.2 Research on the effects of modern IT on management accounting and on the interrelations between the implementation process of new IT and management control

The following section outlines a general picture of research on the interface between accounting/control and IT outside the AIS domain. A few illustrative examples are used in this analysis (cf. Ahrens & Chapman, 2006). This strand of research is different from the first one as it, rather than starting from IT issues, takes explicitly as its starting point accounting and control problems. It incorporates IT as a special factor (potentially) affecting management control systems and their use. These studies are seldom interested in the technical details of information technologies, but concentrate on managerial issues. The authors of these studies do not seem to have an AIS background but typically

one in management accounting. In addition, these contributions are published in accounting/management accounting journals instead of AIS/IS journals.

Part of this branch of research focuses on “visible” effects of new IT on accounting logic, techniques, and reporting practices (e.g. Granlund & Malmi, 2002; Booth et al., 2000; see also Hyvönen et al., 2004; Ribeiro & Scapens, 2004). These studies have employed the survey method or the case method, though the latter one being typically not in-depth in nature. Regarding ERP systems, these studies have typically reported moderate impacts on management accounting practice. In-depth case studies informed by social theories focusing on the process of change form another branch of studies in this category. These studies are interested also in the “invisible”, in the ways people mobilize new technology in their everyday operation, and how this may affect formal and informal management controls (Scapens & Jazayeri, 2003; Dechow & Mouritsen, 2005; Quattrone & Hopper, 2001, 2005, 2006). As Dechow & Mouritsen (2005) point out, it is not only a question of positive or negative, enabling or restrictive, effects of ERPS on management control, but about new forms of MC that are not related to accounting processes.

An example of an early contribution is Frances & Garnsey (1996). Starting from the issue of control in new organizational configurations, they analyze at the macro-level how EDI and EPoS (electronic point-of-sale scanners) technologies have enabled business integration and transformed control relations in logistic chains in the U.K. grocery sector.¹² Despite the technology studied (its nature and generation) we learn a general lesson of the transforming capacity of new IT regarding organizational and market relationships. In addition, the authors outline both inter- and to some extent intra-organizational consequences of EDI and EPoS adoption for accounting and control. The explicit focus on control issues demarcates this study from most AIS research that makes the study most relevant to the accounting community as such.

One of the very first published studies on ERPS and management accounting was the cross-sectional field study by Granlund & Malmi (2002) on the effects of ERPS on management accounting techniques and the role and organization of the finance function. They conducted a study of 10 companies at a time when there was practically no public knowledge on the issue whatsoever. Their straightforward analysis tried to provide some light on previous statements, or rather empirically unproven assumptions, suggesting massive changes in management accounting due to ERP technology. They analyzed the data by dividing effects into direct and indirect ones. The most visible and at the same time direct effects related to the enabling force IT has

¹² See Bloomfield & Vurdubakis (1997; see also Bloomfield & Coombs, 1992) for a micro-level analysis of the management – technology interface, and how organizational ideas about what is relevant information are constituted.

had regarding the role of accountants and the resources of the accounting function. They also found that ERPS had had so far moderate effects on management accounting techniques, contrary to expectations expressed in some earlier writings. They went on to speculate on the limitations of the study regarding the short period of experience of the new technology in the studied firms and the technical limitations of the systems of the time of their study.

A rare example of conceptual research in the field is the study by Brignall & Ballantine (2004). They present an accounting/control focused (again published in an accounting journal) conceptual analysis of SEM (Strategic Enterprise Management) systems, which are special software packages typically intended to work on top of ERP systems, facilitating the huge amount of data stored in the ERPS database. Whilst the paper (p. 26) is right in saying that “little is known about the interaction between performance measurement and management (PMM) and the many ways in which organizations strive to improve their performance”, the purpose to study interrelationships among SEM systems, PMM and organizational change programs seems somewhat obscure. Even if the general purpose is warranted, there seems to be some misspecification or misunderstanding regarding the content and meaning of SEM software.

The reason for this may derive from the fact that one can easily fall for the rhetorics presented in ERP/SEM vendors’ marketing material and presentations: SEM products may be presented as being more than one way to technically build ABC/ABM, BSC, or other strategic management tools into software solutions. The rhetoric around SEM mobilizes a strategic view, but in reality SEM software is just another way to implement strategic costing and performance measurement constructs, even if a particular integrated solution for that purpose. In this light, the objective of building an agenda for future *SEM system research* (p. 234-236) seems meaningless, as there is not much (theoretical) point in studying a specific software package. Stand-alone systems can also be built to support integrated strategic management so that they can facilitate ERPS databases. In the end, it is up to the users and the different ways to use strategic management accounting tools via software that makes a solution strategic (or not). Software development does not drive management accounting logic, as such.

On the positive side again, Brignall & Ballantine (2004) correctly point to the potential of using insights from several theories and a process perspective (Pettigrew, 1985) in studies on IT and control systems. They conveniently consider the perspectives of different stakeholders in this context, even if they seem to ignore the role played by software vendors and consultants. In addition, while discussing the complex and problematic reality of truly

enterprise-wide implementations of integrated information systems (see Markus et al., 2000) and the effect of institutional forces, they also recognize the possibility of ostensible realizations. In other words, while firms may publicly tell and be known of applying an enterprise-wide information system, the reality regarding the scale and scope of system implementation and use may be far from the public idea (see e.g. Quattrone & Hopper, 2005).

The most recent contributions in this field include Dechow & Mouritsen (2005) and Quattrone & Hopper (2005, 2006) applying the Actor-Network Theory (see also Cuganesan & Lee, 2006). These studies aim to go beyond the “visible” and analyze the variety of people and practices that are affected by ERPS implementation. They are after the wider management control implications regardless of whether they are directly related to accounting controls or not. They are also explicitly interested in other users of accounting related information than just the ones typically presumed. They are strong, for instance, in showing how global concerns become localized and what kind of political processes we can find around such processes. They further demonstrate how new technologies are made to work in everyday practice, when the formal system architectures fail to deliver needed functionalities. Such contributions open a new avenue for research by pointing out the limitations of causal assumptions regarding IT – control system relationships. Thus, these studies provide a basis for deeper understanding of the IT – control interfaces, even if also they seem many times to fail to describe the current technologies.¹³

The single most important contribution of especially Dechow & Mouritsen (2005) is the revelation of the fact that information system configuration may define (enable and disable) certain aspects of management control. Such effects are not clearly visible, and many times decision-makers are unaware of the consequences of the choices they are asked to make during system implementation. Such effects are further discussed with examples in the following sections. Dechow & Mouritsen (2005) and Quattrone & Hopper (2005) offer important contributions also because they explicitly point out risks, difficulties, and limitations of new technologies. Also Granlund & Malmi (2002) are explicit about the variety of problems firms have faced when implementing ERPS. Yet, many studies in the field seem to concentrate on the benefits and seem at times to be “dazzled” by the new technology.

¹³ There is also an emerging literature analyzing the communicative aspects of ERPS implementation and thereby to some extent the consequences with regard to control (e.g. Dillard & Yuthas, 2006; Rose & Kræmmergaard, 2006; see also Hyvönen et al., 2008). These studies are typically critical of the current thinking in the AIS field, which takes technology too much for granted while downplaying or even ignoring the role of organizational actors in the implementation process: in how technology gets intertwined with learning and diffusion of organizational values.

Some of the studies in this stream focus on the role of accountants and other professional occupational groups (Caglio, 2003; Scapens & Jazayeri, 2003; Hyvönen et al., 2009; see also Newman & Westrup, 2005). They often argue for hybridization: professional groups including health care specialists, army officers, IT specialists, and other non-accountants start doing accounting as a consequence of adopting new technology (typically ERPS). On the other hand, hybridization may mean that accounting professionals become hybrids that need to have expertise in (and responsibility for) general IT system issues. Hyvönen et al. (2009) also point out that the role and function of (management) accounting within specific organizations may have an influence on the implemented IT, at least on the scope of its application. This is an interesting insight, as typically studies in this field only analyze the effects of IT on accounting and control.

The studies in this broad category typically also recognize other drivers of the shown developments: changes in the role of accountants and changes in accounting processes. Clear causal mechanisms are therefore difficult to reveal according to these studies, as so many factors seem to be involved in the re-engineering of business processes. Besides, many of them also point out that the boundaries of accounting are changing due to lateral process orientation and hybridization. This is important as it renders us look beyond “accounting stories” of what happened, and to see the scale and scope these system changes have. They thus help us to realize important developments regarding management control that would not become visible by only looking at formal accounting processes. In sum, they emphasize that ERPS and IT developments in general are redefining organizational borders, which is not important only because it has effects on the accounting profession, but because it also affects the exercise of inter- and intra-organizational control overall (Mouritsen & Thrane, 2006; Thrane & Hald, 2006).

While the studies referred to above recognize recent developments in the field, they seem to focus solely on ERP systems. Furthermore, they are seldom able to describe the technology in concrete terms: what it "looks like", what is the IT architecture like, or how meta-data is configured and decided upon. Hyvönen et al. (2006) is an exception as it analyzes a stand-alone accounting software package and its effects on control practice and role in overcoming resistance to management accounting change. Also Granlund & Malmi (2002) and Dechow & Mouritsen (2005) analyze the role of and division of labor between ERPS and add-on solutions to some extent. However, the current research efforts seem to concentrate on ERPS while ignoring other important developments in the field, such as the design and implementation of stand-alone solutions that may also have many ramifications for accounting and control.

In sum, some of the earlier studies on the interface between accounting/control and IT have focused on the effects of IT on management accounting techniques while others have examined how technologies are made to work in practice. All the studies still seem to agree at least on one thing; ERP and other new technologies as such have not caused major changes in the accounting domain, but they have been used to drive larger and smaller improvements in accounting and control practices in different locations of the examined organizations. The differences in these studies mainly relate to the approach with regard to whether we can observe (causal) effects between the examined constructs, or whether we should see them as intertwined in such a complex manner that they can only be analyzed together, seen as constituting each other.

3 ENABLING AND RESTRICTIVE EFFECTS OF IT DEVELOPMENTS VIS-Á-VIS ACCOUNTING AND CONTROL PRACTICE

This section will briefly examine the recent developments in IT having implications for accounting processes, personnel, and organization of the accounting function. It describes the potential of new information technology to transform (for its part) accounting into a proactive knowledge service profession. In practical terms, the analysis supports a view that the potential of new IT has so far been taken advantage of in the accounting domain to a limited extent – i.e. that many major changes in the accounting - IT interface may yet be in the offing – even if in general modern accounting is done through IT. The section aims to demonstrate that most current accounting research – even that focusing on the accounting – IT interface described in the previous section – does not address the recent IT developments comprehensively.

The described developments in terms of automation, outsourcing, and so on are all signs of the fact that today accounting, as a function, has to demonstrate efficiency. Tight global competition forces companies to search for cost cuttings in all functions, including support functions. The call for better decision and control support (value added) together with cost effective processes has led to outsourcing and the establishment of company internal shared service centers, to more efficient accounting processes in general. Accounting information should be produced correctly, consistently (audit trail), objectively, systematically, on-time, faster and faster¹⁴, electronically, and cost efficiently. It is a fact that IT can help in realizing these objectives. Another question though is, does this also mean faster decision times and more efficient decision-making? This assumption is problematic, and it will definitely not flow automatically from enhancements in IT.

In general, internet-technology (including web-based standardization projects: XML and XBRL, see Debreceeny & Gray, 2001; Deshmukh, 2006) combined with modern software package development (including ASP-technology: application Service Provider, software rental over the internet; see

¹⁴ Faster and faster reporting cycles is a demand that seems not to emanate only from the constant changes in the market place, but also from the financial markets: this may not be reasonable regarding strategic decision-making. It may be important to be able to say in public that all reporting processes are fast for image and legitimating reasons.

Harney, 2002) has led to a situation where rehearsal of accounting and control is in principle independent of time and space.¹⁵ In multinational companies, modern IT has been used to create global information systems. At the same time, these developments have helped accounting in demonstrating functional efficiency.

It is obvious that developments in IT have greatly enhanced routine accounting tasks and the process of closing accounts. For example, financial statements can be generated on a daily basis with small error margins (called fast/virtual close). These enhancements have evolved from the digitization of the document mass and its consequent faster, more reliable processing, as well as easier and more efficient information sharing. This is a promise that has already been delivered. However, even this development path has been a slow one in many countries, including the U.S. and the U.K. In some countries like the Nordic countries, where there is already a long tradition of e-banking, the development has in this regard been faster. However, even there the speed has year after year remained considerably lower than predicted by commercial research institutes. Commercial surveys seem to suggest it is not that customers would suspect the financial benefits of the new technology, but rather that most (smaller) companies are reluctant to adopt new IT due to the costs (including hidden costs) involved, and the fact that they have many other development projects simultaneously ongoing. Therefore, it seems in many cases to be a question of inadequate resources. In some cases, it also seems to be about suspicious attitudes, even fears towards new technologies. It seems that as long as old systems and routines are still working and there is no compelling pressure deriving from legislation, group headquarters or customers, the change does not really take off. This has led to situations where new technology is not taken into use no matter of the various positive arguments for it, or if it is implemented, it is not used to the extent intended.

Data warehouse technology and the rapidly increased supply of analytical package software (Data Warehousing, OnLine Analytical Processing, OLAP; Data Mining; Business Intelligence Portals; see Berson & Smith, 1997; Thomsen, 2002) have empowered many enhancements in multidimensional analytical power and the efficiency of accounting processes, but obviously only to a limited extent. New IT has also enabled on-time and easy-to-use rolling forecasting systems for global companies. However, there exist indications that companies around the world are not using the analytical

¹⁵ Another important area that emerged during the 1990's in addition to ERPS is overall the business applications of the internet and groupware. Increased use of the internet has meant that more and more business information is nowadays stored in corporate intranets. Thus, in addition to text and numerical data, business units can now share unstructured information containing sound, visual images and video. Electronic mail, bulletin boards, and discussion groups are also examples of applications that exploit the integrated information platform. Because of these applications, more and more business information is now accessible to all units, despite their geographic location.

capability embedded in ERPS and other software packages to anywhere near its full potential (see White, 2004). Overall, we have very limited research knowledge on the content and control implications of the new IT from web-based electronic invoicing to implementation of data warehouse and applications facilitating user-friendly multidimensional analysis, with or without ERPS.

The benefits flowing from new IT in the accounting domain thus seem obvious in principle. The enabling power of modern IT is unquestionable with regard to efficiency in transaction processing and (basic) financial and managerial reporting. However, also problems and restrictive effects emerge with the introduction of new IT. In the ERPS environment, the configuration process that occurs when implementing the system dictates what can be done and what not with the system in practice (Dechow & Mouritsen, 2005; Dechow et al., 2007b). For example, adding a new legal or management entity to an ERPS after the implementation process is not an easy task. This will require adding such a functional entity to the ERP transaction system, which again requires work by IT people (and implementation consultants) with regard to the reporting tool. Another aspect is that the particular technology adopted may not allow certain accounting choices to be implemented. For instance, the ERPS may not allow a desired way of calculating transfer prices, because this option had been excluded due to choices made earlier in the configuration process (Dechow et al., 2007b).¹⁶

Of course, also here the software vendors (cf. mimetic and normative institutional pressures; Granlund & Lukka, 1998) play an important role. If one reads the sales material and product descriptions, it seems that companies simply cannot live without these solutions. The rhetoric is persuasive of the benefits, and no doubt, many of them may be real (e.g. Hyperion Performance Suite, 2005, p.3):

Interactive, personalized dashboards empower managers and knowledge workers to make smarter decisions and improve business performance. With at-a-glance summaries of key performance indicators (KPIs), users can quickly spot trends and anomalies and select different views of data. Additionally, they can drill to the next level of detail to gain valuable business insight and take effective action. [...] With dashboards on every desktop, senior management as well as individual decision-makers can monitor the performance of their organizations, adjusting strategies and modifying day-to-day activities for breakthrough results. And because users can drill down to view progressively more granular detail, IT spares the extra time and effort of

¹⁶ Quattrone & Hopper (2001, p.242) describe how the SAP R/3 ERP system introduces moving averages for stock accounting and control as 'best practice', and therefore uses this method instead of weighted average and FIFO desired by the customer company. This is a good example of what it means that an ERPS package may dictate the 'best practice'.

generating multiple personalized views of requested data. [...] When all decision-makers in a division or department have access to personalized dashboards, managers can instill a “culture of performance” across their organizations. A single, consistent view of information across all departments speeds and improves problem diagnosis and response. Personalized dashboards eliminate the need to reconcile duplicate, conflicting, and incomplete information.

However, as can be seen, the benefits are presented as unproblematic. They also promise more than just technical help. They argue to even change the culture of the customer and improve performance, simply by system implementation. This is naturally questionable in light of academic studies, but is also an issue of future research; what kind of benefits may at best flow from these projects and do they actually change the content (in addition to the form) of managerial reporting and the underlying analytics.

One reason why most accounting academics presumably do not to have a good understanding of the developments in the IT/AIS field may also emanate from the fact that it is increasingly difficult to follow this “moving target”. Technologies change rapidly and many have probably given up trying to follow the developments. Sales materials, like the one quoted above, may also make the issue unappealing from a scientific point of view; why should we care about this nonsense? Indeed, there are also mere rhetorical changes going on. For example, what software vendors now call Business Performance Management (BPM) is merely a new name for existing tools and practices when they are combined in a particular solution (like in case of BPM combining ERP and Business Intelligence systems).

On the other hand, reading academic studies in the field (e.g. Mauldin & Ruchala, 1999) raises many questions of how well researchers know the everyday life of financial professionals of today. More than half of the working time may be devoted to system design and implementation, negotiations with software vendors, teaching other people to use the new system, and integration of the different systems into a working platform. We have plenty of (more or less anecdotal) evidence of how fast growing companies hire Controllers/Management accountants to take care of a number of tremendously increased accounting tasks. Among other issues, they are often responsible for setting up working management accounting systems from budgeting to sophisticated profitability analysis and managerial reporting. Granlund & Malmi (2004) report one such story: during the following two years after being hired, the Controller spent most of his time purchasing, implementing, altering and integrating accounting software. The Controller himself concluded while discussing accounting system development projects that, “it all comes down to software”.

Related to this, many accountants have been and currently are heavily involved with ERPS implementations and version up-dating projects (Newman & Westrup, 2005). ERPS implementation projects are not, contrary to some perceptions, only temporary rehearsals, but ongoing, perhaps permanent states of affairs implying versioning and updating occasionally. The belief that upgrading an ERP system version would be easy is incorrect: they are separate laborious and costly projects. Overall, ERPS and other software projects have had notable implications for accountants. The tasks they need to carry out increasingly include other than typical accounting tasks, such as general information system design where they need to evaluate current and future standard and ad hoc reporting requirements, software purchase, software implementation, and training people to use ERPS and other software packages. In addition, such projects often mean that accountants get a “new” job as main users of the new system, including system maintenance. They become responsible for making changes to the system when required due to organizational changes or new reporting requirements.

Currently, it seems that we cannot expect particularly large changes in accounting technologies as such, but rather in the modes of operation (statement based on a number of commercial surveys by IDC Research, 2005-2008). We now have such technology, which allows digitized accounting processes, not to mention the developments in legislation, which neither sets obstacles to this development any longer. However, firms are overall slow in implementing new technology despite its possibly demonstrated benefits. It is not about having sophisticated IT, it is about its implementation or rather about the barriers of implementation: lack of time and resources, high costs (including hidden costs), and behavioral resistance.

One of the big changes will presumably take place in the tendency to increase outsourcing of various accounting functions. We gradually start to have evidence of developments where also other functions than payroll administration and bookkeeping are being outsourced to external service providers. Middle-sized companies have gradually started to outsource their accounting functions, including also managerial reporting, to the so called external “accounting department partners”. A related phenomenon is the fast increasing establishment of Shared Service Centers for accounting activities (see Chapman & Chua, 2003; Tuomela & Partanen, 2003). This mode of organizing certain accounting tasks into centralized functions is sometimes called as internal outsourcing. Integrated IT is said to be one of the main drivers/enablers of this reorganization. The ultimate objective seems again to be the reduction of administrative costs. In addition to the other recent developments introduced in this section – that may have enabling and/or restrictive implications – also this issue deserves much more attention in

future accounting research due to its notable implications not only for accounting processes but also for the profession as a whole. For example, it will be interesting to analyze how it is possible to, and to what extent, to outsource managerial accounting tasks, how this actually works in practice, and what kind of problems this may bring along.

4 ACCOUNTING/MANAGEMENT CONTROL AND ERP SYSTEMS

This section will present an analysis of the relationships the current state-of-the-art enterprise information technology (i.e. ERPS, together with internet technology) has with accounting and management control. Because of its dominating position in the field in terms of both research and practice, a further analysis of this technology seems warranted. In brief, ERPS are about integration, standardization, and centralization (Scapens & Jazayeri, 2003). ERPS also manifest best practices in the line of business and foster benchmarking activities within companies, as they aim to make information generally consistent and thus commensurate. They propose significant enhancements in corporate management: ERPS introduce companies with the process management ideology, management-by-facts (reduced role for intuitive decision making), and real time management (as ERPS work in real time). Overall, ERPS can be seen as massive management control system packages (Otley, 1980; Abernethy & Chua, 1996) that integrate various (formal) accounting and non-accounting control systems.

During the 1990's, more and more companies started experimenting with ERPS. These systems promised a possibility to share basic business information across all units over public global networks (Bancroft et al. 1998; Lozinsky 1998). Thus, business units operating in different countries or even in different continents could share information: the centralized ERP databases contain information about orders, deliveries and payments keyed in from all units of the enterprise. In addition, these databases contain basic business data about customers, product structures, inventory levels, personnel, and financial accounts. Even those companies that choose not to invest in an ERPS package now develop data warehouses that consolidate key business information from local systems in different units.

No wonder that the ERPS vendors have claimed that their products would yield significant improvements in management reporting and control activities (Davenport, 1998; Fahy & Lynch, 1999). The enterprise wide integration and standardization of systems and information yields improvements in data integrity and efficiency gains in site-to-headquarter reporting. The collection of information about operations and the consolidation of this information to managerial reports will be much more consistent throughout all units. In practice, this also means that while firms previously had a large number of

different persons taking care of particular reporting activities in every subsidiary, firms will increasingly use a much more limited number of persons to take care of that certain activity through the whole company.

Through the centralization of data management, there may sometimes emerge problems related to the relevance of the information as comes to local decision making: all country specific needs may be cut off (Scapens et al., 1998). Even damaging effects caused by ERP-systems regarding strategic learning and flexibility have been put forward (see Fahy & Lynch, 1999.¹⁷ Therefore, it seems necessary that successful operation with the new technology requires new managerial skills (Dechow et al., 2007b), experienced users, and developments in the technology itself in the future (Granlund & Salmela, 2000). There is also evidence that local systems may prevail even in situations when the pressure to standardize coming from the HQ is penetrating (Granlund & Malmi, 2002).

Integrated technology (especially ERPS) has been suspected to crowd out or at least limit the scope and applicability of local and informal systems (Chapman & Chua, 2003). This can be paralleled to a more general tendency of multinational/global organizations to standardize IT and control systems globally. Whereas this is well justified in terms of consistency and accuracy as well as cost savings, it may pose a threat to the quality of local decision support (Scapens & Jazayeri, 2003). In cases where the specific local information needs are not fully met by the global ERPS, additional software and spreadsheet models will be needed. However, there seems not to be reason to expect for a counter strike from the local systems threatening the position of ERPS as the main system.

The need for local systems may virtually emerge from the fact that in many large (many times globally operating) companies using ERPS, the control of reporting processes and the report menu is centralized to the headquarters (Granlund & Malmi, 2002, 2004). In order to make a change, i.e. if you want to have a new report to appear in the reporting menu, you have to apply for it at the HQ. If there are enough similar requests, the report in question may be added to the “report tree”. Otherwise, you have to construct the desired report yourself, if possible. This is one more indication of how local needs may suffer at the expense of a globally coordinated information system that is thought to be efficient and beneficial in all respects.

Regarding accounting personnel, integrated information systems have allowed the establishment of Shared Service Centers and operation with a relatively lean staff in the midst of hasty growth. In some cases, the adoption of ERPS has also led to a reduced number of staff, including accountants. On

¹⁷ See also Cooper & Kaplan (1998) for the potential of misusing real-time information of ERPS regarding strategic decision-making.

the other hand, ERPS have in general enabled accounting personnel to devote more time to business supporting strategic analysis in the long run as most routine tasks have been automated (Granlund & Malmi, 2002).

In line with Chapman & Chua (2003) this study takes also issue with how ERP technology changes organizations in general; their form and processes, and what are the implications regarding management control as a whole (see also Scapens & Jazayeri, 2003; Dechow & Mouritsen, 2004, Quattrone & Hopper, 2001, 2005). Whereas we gradually start to have studies revealing these implications, our knowledge of them is still very limited. As every ERP project seems to have its special features, not least because the technology is embedded in different contexts and is in every single case appended by a set of stand-alone systems, it is still too early to claim for general patterns. More research is needed from a variety of perspectives. ERP technology obviously may change management control practices, but this may not happen in every single ERP implementation, or at least in a specific way.

Because there are many different configurations/implementations as well as usages of ERP technology (as well as there are many uses of management accounting tools), the implications can also be many and emerge in different forms. This is a largely neglected aspect in earlier research. As Granlund & Malmi (2002), Quattrone & Hopper (2005) and Hyvönen et al. (2008) point out, ERPS implementation projects are unstable and their effects appear to be inconsistent across organizations; two similar ERPS projects do not exist. While in some cases ERPS may have paramount effects on organizational design and management control (in its widest possible sense), in some companies they only seem to work as production and logistics systems, or, regarding accounting, they are seen only as transaction processing systems and data consolidation tools at best. Granlund & Malmi (2004) describe the case of a paper mill, where despite that upper level managers said that all budgeting was carried out in the ERPS, the actual practice – revealed in the interviews with the controllers – was that budgets were made in a spreadsheet solution and then only copy-pasted to the ERPS for distribution. The techniques/logic of budgeting had not changed and neither any responsibility or accountability relationships due to the ERPS implementation. Many of the changes claimed for by upper level managers appeared to be ostensible.

One of the most debated issues in the research on ERPS and accounting/control that deserves particular attention is whether ERP systems have an effect on management accounting practices or not. Whilst this may appear as a single issue of discussion and debate, it is also illustrative of the different streams of research in the field and the contribution they aim at and are able to produce. While it is exaggerated to say that there has emerged a “theory” of ERPS’ moderate effects on management control (Dechow &

Mouritsen, 2005), research results pointing to such direction have been presented in a number of studies: surveys (Booth et al., 2000; Gabriëls, 2007), cross-sectional field-studies (Granlund & Malmi, 2002), and case studies (Hyvönen et al., 2004; Ribeiro & Scapens, 2004). Even if the approaches adopted in these studies (mainly economic and institutional) may not be so alert to changes taking place in control practices beyond the accounting domain, we should neither deem such findings outright as unreliable or invalid, because there is no such thing as a typical ERPS implementation. The breadth and depth of technological diffusion and, for example, integration varies from one organization to another. Therefore, it may be too daring to generalize from these findings. Such findings may have been discovered in a certain place in certain point of time; going back to the same place in another point of time might change the view.

Some of the problems or misunderstandings residing in this discussion relate to the different aims of the studies (see Rom & Rohde, 2007). In the studies mentioned above it is typically made clear that the study is about the effects of ERPS on accounting techniques/logic, not on management control in a wider sense. In other words, such studies are explicitly limited to the “visible” and explicitly recognize that the method applied may not reveal the whole picture. The aim may have been to “test” the predictions presented about the paramount impact of modern IT on accounting: have the supposed changes already taken place or not, and if, then in what sense and magnitude (e.g. Granlund & Malmi, 2002). In addition, these studies are typically explicit in pointing out that things may look different as time goes by: the companies may have had only limited experience of ERPS and the implementation processes may have been largely unfinished. In general, one reason for why there may not have occurred visible changes in accounting after implementing an ERPS is pointed out by O’Leary (2004, p. 68): “In general, ERP systems employ classic accounting processes as a part of their best-practice portfolios. As a result, there is a focus on traditional accounting artifacts, such as the general ledger”.

Dechow & Mouritsen (2004, 2005; see also Quattrone & Hopper, 2001, 2005, 2006) offer a very different view on how ERPS are intertwined with organizational practices. They are explicit in saying that they are not after “simple” cause and effect relations, but look at the complex intertwining between management control and IT. They offer a different and new view on the phenomenon in presenting a comprehensive analysis of the networks of human and non-human actors through which the ERPS are implemented and shaped. They also problematize the sphere of accounting calculus and accounting work. Overall, they suggest that the “theory” of moderate effects is flawed: ERPS may have significant impacts on management control, as they

change the ways in which business operations are modeled and how things can be calculated and accounted for (see also Arnold, 2006; Dechow et al., 2007a). However, here is perhaps the key: they discuss management control in much wider sense than just management accounting techniques, the explicit focus of the studies demonstrating moderate impacts.¹⁸

The merits of the recently emerged ANT-informed research stream though seem obvious, even if their results may not be directly comparable with the results of studies applying different approaches. In any case, their wider scope extending beyond management accounting is already an important contribution as such. They provide general lessons about the relations between management control and IT that help us to understand the complexities involved therein. They also provide important insights in pointing out that accounting may not be the dominating mechanism of management control. However, such results may not be unproblematic either. For instance, in Dechow & Mouritsen's (2005) case study this result may be affected by the fact that they mainly examined the former SAP R/2 technology instead of R/3. Furthermore, the case companies did not implement the controlling (CO) module of the system, which again may have implications regarding some of the results. We neither are offered much evidence on how performance measurement and budgeting overall worked in these firms, and how they linked to the ERPS: it may be that they did not link due to the lack of CO-module implementation and a data warehouse typical of more recent ERPS implementations. In addition, if the firms had implemented the CO-module it might have led to the introduction of the German notion of "Controlling" embedded in the SAP R/3 system (Sedgley & Jackiw, 2001; Becker & Messner, 2005).

Considering these issues, it may not be surprising that authors may end up observing and emphasizing the relation – even controversies and contests for power – between logistics and *financial* accounting. This could well explain the conclusions on the lack of changes in management accounting related control systems and the relatively unimportant role of such controls. Such conclusions that (management) accounting is reduced a ritual only (Dechow & Mouritsen, 2005, p. 717) do not gain unreserved support from other studies, which have demonstrated much more integrated IT architectures in globally operating firms than Dechow & Mouritsen (2005), for example. In some cases,

¹⁸ Actually, many studies thought to find only moderate effects demonstrate more or less notable changes in management accountants' work or the organization of the finance function. Some readers may have thought that the authors have assumed that more sophisticated management control techniques would emerge. However, if we read these studies carefully, none of them actually seems to suggest this. Most of these studies are also precise in concluding that this is what they found in particular companies at a particular moment in time. One explanation for time lags appears to be that it may be too risky to simultaneously change logistics practices and control systems (Granlund & Malmi, 2002; Quattrone & Hopper, 2005).

the accounting function has served after the ERPS implementation as a nerve centre controlling all information flows of the company through a centralized reporting system, where all reporting needs are to be discussed first with them (e.g. Granlund & Malmi, 2002).

This, again, does not mean that such a phenomenon (accounting as a ritual only) was not observable in those cases, and, of course, does not undermine the important general lessons learned, but rather that such conclusions on the effect of ERPS technology on management control may not always hold. They may be subject to the version of the system, scope of implementation (modules), other software packages used for management control, the sophistication of the management control tools *used*, and the management and managerial philosophy of the organization. As Sutton (2006, p.3) argues, whereas “[A] number of case studies have been completed that examine how enterprise systems impact managerial control environments [...] we really need to move to the next stage with the development of more generalized theories that help us to understand the phenomena in a more generalized fashion”.

Another issue deserving some further examination in this context is the effect of ERPS on accounting work. A number of studies suggest that ERPS drive a role change of accountants from bean-counters to business analysts (Caglio, 2003; Scapens & Jazayeri, 2003). Some authors (e.g. Quattrone & Hopper, 2005) seem to be very optimistic about the capability, will and (time) resources of non-accounting personnel to create information to suit their purposes. In other words, we may ask how widely this conclusion is applicable. Anyone with access, especially if it is directly to the ERP’s database (p.759), will definitely not be able to do this. They may over time learn to do some analysis and reporting for themselves, but experienced accounting personnel is needed to do comprehensive and advanced analysis (Granlund & Salmela, 2000; Granlund & Malmi, 2002). One of Gartner Group’s recent surveys (2005) actually predicts that large businesses will need three times as many business intelligence personnel in ten years time. The survey also points out that a lack of user skills and knowledge of best practices will form the most important barrier to business deployment in the near future. Whether such results can be trusted is an appropriate question, but they might be indicative of the fact that there will always be a need for specialists who know how to best take advantage of new (and expensive) information system investments.

This argument is further supported by the centralized data management structure of ERPS. This approach does not promote autonomy and “self-service”. Therefore, when discussing hybridization and whether accounting tasks are flowing outside the accounting function, it is important to demarcate

analysis and reporting from recording, and further advanced multidimensional analysis from simple scorekeeping. A good question also seems to be, is it ERPS that enable and drive line managers, for example, to analyze budget variances by themselves or would this happen in whatever IT environment, if given access to the reporting system? The answer seems obvious: this is not tied to the specific technology, but it depends on access, user interface, informing of the possibilities, and training.

In conclusion, it is important to analyze the results of earlier studies not only based on their methods and theories, but first on what they try to analyze and achieve. It is important to pay attention to how the different studies actually frame the results. For example, it seems that Granlund & Malmi (2002) do by no means suggest a “theory” of moderate effects, even if some authors may have interpreted it so. They neither suggest “no changes”, but actually report many changes, even if not regarding management accounting techniques. In addition, because of the many faces of ERPS and integration, it seems to be risky to generalize in one way or another about the general validity of results produced with different research approaches, even if we can in general agree that in-depth case studies have significantly deepened and broadened our understanding of the topic in question.

5 DECREASING OR INCREASING COMPLEXITY?

This section further elaborates developments in data warehouse technology, the emergence of Strategic Enterprise Management software (SEM), and particularly system integration design. These topics have emerged to be in the core of recent discussions in research and professional magazines, thus deserving elaboration with a view of future research. The analysis seems to reveal that recent developments have led to a paradox: contrary to many promises and expectations, system vendors have at times introduced increasingly complex IT architectures in the accounting domain. Promises of reducing complexity are embedded in statements, such as the following: “Customers today need to be able to implement their business strategies quickly and flawlessly. At the same time they need to *reduce* both their total cost of ownership and the *complexity* of the IT infrastructure. SAP Systems Integration is a proven success story” (H. Kagermann, CEO, SAP AG, SAP web-pages).

This kind of quotations point not only to the fact that information system integration can take several forms and be seen from different perspectives, but they also drive a need for analyzing the issue at different several levels. Integration can take place at the data level, while an analytical application may not be otherwise integrated with a basic system, such as an ERPS (see Booth et al., 2000; Rom & Rohde, 2006).

Leading ERP vendors have introduced new integration and application platforms (e.g. SAP NetWeaver, based on SOA, Service Oriented Architecture; see Campbell & Mohun, 2006), which imply the promise of open integration (cf. the general idea of Enterprise Application Integration [EAI] and Middleware; see Serain, 2002; Britton & Bye, 2004). This is what the CEO of SAP AG actually refers to above, and is in line with reality at the general level. However, when we come down to specific functions, such as accounting, and the functionalities information systems can support it with, the reality tends to be different (Granlund & Malmi, 2002; Hyvönen et al., 2006; 2009). On the other hand, this technology – developed by a consortium involving major players from Microsoft and IBM to major ERP vendors is only very recently introduced, and we do not have much experience of it yet. The promise of such integrative development is welcomed, of course. The ideal in the IT world would be, from the users’ perspective, a situation where

you can buy best-of-the-breed solutions for all activities, without having problems with making them work together seamlessly. Whereas this may be possible soon, there remain many questions as regards, for example, working together with a dozen of different software vendors, again.

Dechow & Mouritsen (2004) suggest that such modern management tools such as ABC and BSC are linked to ERP technology as such, at least at the idea level. In practical terms, most of these applications are operated outside the basic ERPS. One reason for this, Dechow and Mouritsen (2005) suggest, is that accountants want to secure themselves a place of “informational darkness”. The results of some studies would in this regard suggest that while in some cases this might hold for certain individuals, the reason for using spreadsheets instead of the ERPS mainly emanates from poor or lacking functionality, as simple as this may sound (Granlund & Malmi, 2002). This points to the deficiencies and rigidity of ERPS’ reporting functionalities. The major contribution Dechow and Mouritsen (2005) present in this context is rather the extensive description and explanation of how and why such “tricks” are used to enable analysis and reporting when the ERPS cannot produce the desired information.

The problems associated with ERP technology in this respect have led to the development of SEM-products and multi-level architectures where it does not matter any longer, what is the underlying transaction processing technology, ERPS or something else. ERP vendors themselves increasingly call ERPS as transaction processing systems, on top of which different software layers are built: middleware, data warehouse applications, and finally analysis and reporting systems that could be called as value adding applications (that are very often software products purchased from other vendors). For example, “corporate war room” presentations are simply illustrations of the BSC concept as such; they do not add anything to the concept, and they definitely are not ERPS related phenomena only (cf. Brignall & Ballantine, 2004). It seems to be reasonable to say that there is no logical link to ERPS here. ERPS relate to this only as data feeding systems. ERPS may carry out this role better or worse than some other system proving data for calculation. The same applies to relational database technology, which is applied today in all advanced software development.

As a further example of confusing accounting – IT interrelations, let us have a look at activity-based costing within the leading ERPS, SAP R/3. The form of ABC embedded in SAP is originally cost center based standard costing (German Grenzplankostenrechnung; Sedgley & Jackiw, 2001; see also O’Leary, 2005), which is not the same form of ABC we know from Anglo-American literature. Because ABC has not worked in ERPS, some of the ERPS companies have bought during recent years companies specializing in

ABC software to provide customers with such ABC functionality they want. These separate ABC software may then be attached to ERPS in very complex ways, implying multilevel IT architectures.

An example of such architecture – that might actually be considered very complex and representing even lack of common sense – is given in Figure 1. It describes one solution available in the market to integrate Activity-Based Costing software with an ERPS. This solution has resulted in a five level architecture, which is inflexible as changes occur (reorganization, mergers, implementation of new software, version updates). Perhaps it is unnecessary to say that such solutions do not advance accounting practices in the end in any organization.

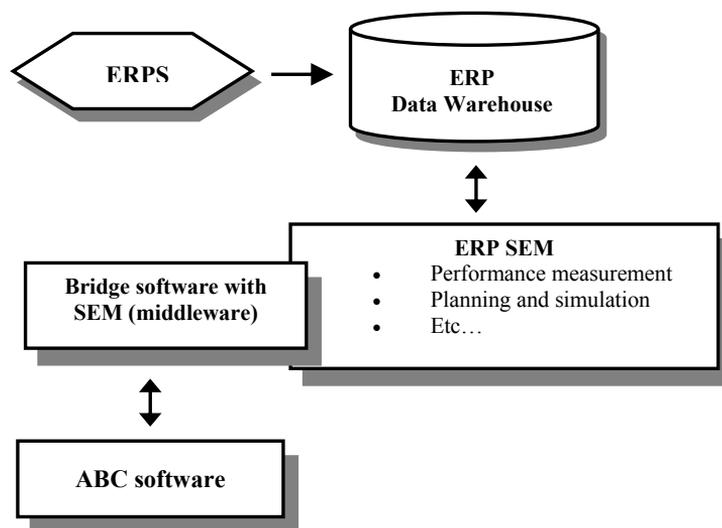


Figure 1: Integrating ABC software with an ERPS.

Later on the ERPS vendor has abandoned new sales of this solution due to occurred problems, but many firms are still globally living with it. This also demonstrates how software firms and the related consultancy industry come up with ideas that seem not to be properly tested before implementation. Products and services are sold making firms to spend considerable amounts of money and most of all time in projects that in the end may not result in working solutions, not even in the long run. Granlund & Malmi (2002, p.306) report about a company that built ABC (Anglo-American version) into SAP, which is exceptional. The description suggests that ABC was retailed into SAP “[...] so that the ERPS vendor would probably not recognize their system beyond it”. This exercise took more than 2000 hours and they were still not

satisfied with the solution. Later they implemented stand-alone software for ABC, where part of the needed data came from the SAP database.

Software vendors typically urge companies to adopt new IT in the name of coping with business challenges. Whilst not arguing this would not many times be a valid point, it is curious why firms need to build complex multi-layered architectures for this purpose. Those vendors that sell specialized software claim that ERP systems are not enough. ERP vendors again claim that their solutions are able to cope with all information processing requirements. Who is right? It seems to depend on the context. In case a firm has been able to successfully implement a single ERP package, there may not be so much need for separate software. However, in a case, which is quite typical, a globally operating firm has many different ERP systems, there is a need for software to handle complex consolidation activities, for instance. Basically all studies on ERPS have assumed that the studied organizations have only single ERPS worldwide (e.g. Dechow & Mouritsen, 2005; Quattrone & Hopper, 2005), while corporate annual reports suggest that very few organizations have been able to adopt a single ERPS for all worldwide activities. This again points to the importance of evaluating in which parts and at which levels of each organization the study has been conducted, thereby also clarifying the scope of applicability of the results. This is important especially as regards control of the corporate whole, where there are tremendous problems with regard to consolidation and thereby comparability and further maintenance of accountability and controllability. From this perspective, there may be more influence (or interaction) from new IT to control practices at local (or e.g. national) levels than when a global corporate whole is considered. Any changes in global control may simply be unrealized because there is no common technology to intertwine with the global control practices. In sum, this is an important conceptual issue to be considered in future studies on ERPS and management control.

The complexity of modern IT architectures is partly driven by the fact that ERP systems are complex and inflexible in the sense that changes in the basic structures (metadata) after the implementation have many problematic consequences for functionality, including managerial reporting. The problem emerges from the fact that the reporting capabilities of ERPS are tied to the underlying transaction systems. For example, as mentioned earlier, adding a new legal or management entity will require the addition of such functional entity to the ERP transaction system, followed by programming work regarding the reporting tool. In advanced stand-alone solutions adding a new entity, account, consolidation structure, or series of reports can be handled easily within the accounting function.

Future research should further elaborate the system complexity issue vis-à-vis implications for accounting and management control. It might be useful to differentiate here between the concepts of complex and complicated. A complex system refers to a system with multiple connections and where, in principle, everything is integrated; related to each other. A complicated system is simply one which in technical terms is multi-layered and consisting of different technologies. It consists of parts of which at least some are “dead-ends” in the sense that not all modules of the total system communicate with each other (everything is not related/connected), but are stand-alone and only get data input from some other modules.

6 CONCLUSIONS AND ISSUES OF FUTURE RESEARCH

This study concludes that, in general, we seem to have a limited understanding of the direction and magnitude of the effects of IT on accounting/control and vice versa. The reasons for this situation can only be speculated on. However, various data sources suggest that this might be simply due to lack of knowledge that has led to lack of interest: the connections between accounting and IT are simply not understood and/or regarded as important, and thereby left without attention. In addition, IT may be seen as a moving target, which may dilute its appeal as a research subject. Indeed, while writing this, there is no guarantee for that all the assertions presented here hold after a few years in the suggested way. In any case, this may have implications regarding research results and for the usefulness of knowledge and theories we want to hold out to various stakeholder groups, including practitioners. In general, the study agrees with Orlikowski (1991a) on that IT can be interpreted as an important occasion for structuring organizations that both facilitates and constrains action. On the other hand, the same can be said about accounting and control systems (e.g. Macintosh & Scapens, 1990). We can also argue that today accounting and IT are inseparable in practice. For example, in case studies, when accountants themselves describe their work methods and the techniques they use, they do it to a considerable extent in terms of how they are realized in software and their use.

The study suggests that accounting researchers should incorporate IT much more thoroughly in studies of substantive accounting developments, as IT today plays practically always an important role therein (cf. Rom & Rohde, 2007). Too often, it seems, accounting researchers take IT for granted; it only has a supporting role. At the same time, they fail to acknowledge the complex relation between accounting, control and IT, which is not to be assumed, but to be unveiled in empirical research (Dechow et al., 2007a). Based on the review, the study endorses statements by Dechow & Mouritsen (2005) that control cannot be studied apart from technology (and context). We need to understand IT developments much better because increasingly managers face the issue of how to manage technology, which conditions management control systems (Dechow et al., 2007b). The configuration choices made in IT implementation are powerful in what they enable and what they make impossible. The important new insight provided by Dechow & Mouritsen (2005) in this respect

is that system configuration defines certain aspects of management control, even though the organizational actors may not be aware of this. Therefore, it is suggested that accounting researchers should ask in field and survey research a wide number of questions related to the implementation and use of IT, as it may have considerable consequences regarding accounting and control practice.

On the other hand, this study concludes that AIS research should focus more on substantive accounting issues. This suggestion is not far from the concerns expressed by Sutton (2005, 2006) or Arnold (2006). The AIS research community should develop a better understanding of accounting research and practice before launching research in the accounting – IT interface. In addition, co-operation between the sub-disciplines should be considerably enhanced to better integrate technological and accounting knowledge. However, the study disagrees with the idea that making task commonalities the common core of future research would be the solution to problems with possible duplication of research efforts, as suggested by Mauldin & Ruchala (1999). Overall, the study thus also gives reason to be concerned about the current state of at least some of the Accounting Information Systems research – to some extent in line with studies such as Rose & Kræmmergaard (2006) – that based on the analysis seems many times to be flawed with regard to research objectives. Naturally, these objectives reflect the underlying scientific values (positivism) that many times may be directed towards overly technical approaches to system implementation. This may have led to relevance and validity problems, especially from the perspective of substantive accounting issues and contemporary everyday life of financial and other personnel. The study further concludes that:

i) We should follow more carefully the plethora of IT developments that have significant direct and indirect consequences regarding accounting and control practice. These consequences are yet largely unknown or unclear and the literature in the area has only started to develop. This is a problem because IT is a central mediator in intra- and inter-organizational accounting and control practices.

ii) IT holds enormous transforming potential regarding the accounting domain as a whole, but the major realizations of it are yet to be realized. This is why it is not too late to start incorporating IT issues into accounting and management control research overall.

iii) Integrated IT has had various transforming influences – both positive and negative – on accounting and management control. Some of them though seem to be ostensible (changes decoupled from action). In general, we seem to have a limited understanding of the relations between integrated IT and accounting/control, and it is currently impossible to make far-reaching

generalizations in this regard. In addition, perceptions of what makes an ERPS seem to vary, and many times it is taken for granted that we can find one single definition for this integrated technology. This may not be the case in practice, as IT infrastructures easily become complex constellations.

iv) The software industry has at times, contrary to some public claims and sometimes to common sense, a tendency to increase rather than to decrease complexity in IT architectures, thereby potentially jeopardizing the coherence and functioning of accounting and control systems. This, too, is an important question for future research: how and why this may happen?

Reflecting on the above and other findings presented in this paper, indeed, it seems that AIS researchers should in general pay more attention to the developments in the field (while insightful contributions no doubt also exist). It is the potential of ASP-technology to transform accounting processes, the need for controllers to implement package software, or the various modes in which people fix problems in integrated system architectures that constitute current practice. Of course, several valid methods can be employed in this journey (Arnold, 2006; Dillard, 2008). As the recent contributions by Scapens & Jazayeri (2003), Cuganesan & Lee (2006), Dechow & Mouritsen (2005), and Quattrone & Hopper (2001, 2005, 2006) have shown, cross-sectional research methods cannot capture the change and flexibility of organizational control practices. Institutional and actor-network approaches can reach beyond more or less simple assumptions of cause and effect and thus sharply contrast with functionalist theories of management control. On the other hand, cross-sectional studies may be used to establish a wider picture of current practices and trends of development. Such research may either test some of the propositions put forward in qualitative research, supplement them, or provide an opening for further (more in-depth) examination in new research areas.

Considering the obviously multi-faceted nature of the topic of this study, the theoretical concerns and approaches described in the beginning of this paper seem all to be viable options for application in future research. Institutional theory is capable of directing attention and explaining the various institutional forces that surround contemporary MCS development projects; particularly the role IT vendors and consultants play in the sales and implementation work. Giddens' (1990, 1991) ideas seem to gain support here as well. Information technology is no doubt an important vehicle for disembedding and re-embedding accounting techniques and practices; both in global and local circumstances. As has been demonstrated in this paper, actor-network theory holds great potential in explaining how IT mediates management control in intra- and inter-organizational networks, consisting of a plethora of human and non-human actors. The last approach can be considered particularly strong for its capability to reveal how formal and

informal management control is actually exercised in practice, and how and why information systems are shaped through these processes, and ultimately become what they are.

The presumable marginalization of IT – even regarding ERPS – by some accounting researchers is peculiar in the light of this study and further in the light that some information system scientists consider ERPS to be too large subjects of study (Ciborra, 2000). On the other hand, AIS researchers are doing valuable research in the accounting – IT interfaces, and do definitely not consider ERPS, for example, as too large or too small research objects. However, they would have much to learn from basic (management) accounting research, where today it is increasingly common not to rush to study various technologies – the starting points of their adoption and the outcomes – but explicitly to try to open the black boxes, i.e. to reveal those processes that lead to a certain result. At the same time, it is important to pay more attention to the forms, which new technologies may take in various locations of an organization or network. Instead of telling an accounting story, a logistics story, or an IT story, we should aim at telling a comprehensive story in order to reveal those new manifestations that accounting and management processes may emerge to have. The latest research results show that changes have taken place with regard to who, how, when, and where is practicing accounting and control (Scapens & Jazayeri, 2003; Dechow & Mouritsen, 2005). The most interesting observation in this regard is that management control practices may have taken new forms, and many relations between and within different functions have changed.

Yet, we may always speculate on whether the skeptics are right in saying that IT is not an interesting issue to study in the (management) accounting context. Is it important in its own right? If knowledge is power (Markus & Pfeffer, 1983) and new IT creates new knowledge, then the answer should be positive. In addition, there is probably no doubt any longer about the fact that IT (while still being fragile) produces transfers in management control. Finally, modern IT seems to propose integration all the time, even if it silences the fact that this may never realize totally (Dechow & Mouritsen, 2005). However, we have limited understanding of the forms, functions and outcomes of integration. Therefore, it is increasingly important to examine these, as they form a core issue in the whole field of modern management control.

This study has outlined current problems and issues for future research at a rather general level; how IT should be approached and incorporated in accounting research, and how the theory-base could be broadened. Some of the issues were analyzed at a more detail level as well, like how some technologies have been applied in practice by different users. Reflecting on Luft & Shields (2003), some further consideration is presented in the

following, especially as regards future quantitative analyses; analyses that should also be conducted in addition to case-based research applying different theory bases. Overall, it seems that, depending on the situation, both moderating and mediating roles should be considered for IT when used as an independent variable in models explaining causes and effects of management accounting (cf. Rom & Rohde, 2007). As such, modern IT has not been included in such models often, contrary to modern production technology, for instance. This seems obscure, considering the important role IT plays in the process of producing and delivering managerially useful information to decision-makers.

The directionality of explanatory models is an issue of future research to consider more thoroughly as well. This study suggests that IT is seldom affected by management accounting developments or organizational transformations: for example, implementation of ERPS has forced organizations to adapt to the configurational structure of the specific IT. Furthermore, management accounting systems are in these environments rather built on the conditions of the enterprise-wide system, i.e. according to the implementation methodologies introduced by implementation consultants, and assumptions on what is available, than autonomously by selecting best-of-the-breed solutions for the different functions of accounting and control systems. On the other hand, we may conclude that people are skilful in repairing the shortcomings of enterprise-wide systems by locally employing additional technologies (Dechow & Mouritsen, 2005). Therefore, it remains an open question to what extent and in what sense we might argue that accounting and control practice may also affect IT. Finally, it is also important to carefully map the levels where IT has implications for accounting and control, as there may be great variation regarding different organizational (e.g. Quattrone & Hopper, 2005) and even beyond-organization (Frances & Garnsey, 1996) levels. Similarly, the effects of adopting modern IT could be observed at the short, medium and long term. Whilst certain effects are observable immediately, others may take effect only after years of experienced use and system development (Granlund & Malmi, 2002).

One important issue to consider in future research endeavors is also the technology itself that we study; what will actually change and how as technologies regenerate. It is a fact that IT changes constantly, even if not radically all the time. Current technologies regarding corporate computing and ERPS technology seem to be going through major changes in the near future as major software vendors have started to introduce the SOA technology. While this may change many things with regard to technical integration and information system design, it does not water down the general lessons that will not change with technological developments. For example, there will always

be a need to model business processes, on which basis IT will be configured, even if according to its own, in-built implementation methodology (Dechow et al., 2007a, b). The technology itself and its configurations are important to study also because they mediate and change vocabularies. For example, a cost center may have a different meaning in an ERPS and in everyday language. It has not been studied how these changes in the nature and quality of such crucial concepts of responsibility accounting as cost center, profit center, and strategic business unit have affected management control.

A specific issue to study in future research is also how IT may contribute to the success or failure of MCS design and implementation (see e.g. Anderson & Young, 1999; Malmi, 1999; Granlund, 2001). Based on this study, there are currently many IT related issues affecting such processes that should be taken into consideration in future research; not only as a group of IT related issues, but as separate factors. Such factors include difficulties in modeling the accounting logic into the system, collecting, transferring and storing of data, insufficient IT knowledge and skills, modeling, analysis and reporting qualities of IT solutions, managing system interfaces and integration, and system scalability. However, ignoring the human side of development projects would be as disastrous in research as it has been in practice. The vast literature on management accounting system change and stability clearly indicates the not so surprising fact that technical problems seem never to be as fatal as problems related to organizational factors. A related issue to be further studied (mainly by information system scientists) is also the devastating effect of failed large-scale information system projects on firms. We have already witnessed cases in the media where it has been claimed that the failed IT project drove the company to bankruptcy. This further emphasizes the importance of studying the success factors of project management.

As Granlund & Mouritsen (2003) point out, the interface of management control and new IT is still an underdeveloped area both empirically and theoretically. However, the studies made so far have developed important learning points. Some of them have embarked on nuanced appreciation of the place of IT and are thus moving our understanding of the relationships between advanced IT and management control ahead. Especially, they have shown that such relationships are complex and may have unexpected directions. However, the studies made so far have only opened the discussion, and there is a great need for new participants in this debate. Indeed, accounting researchers should increasingly follow the speedy development of IT and investigate the potential and realized changes it may cause for accounting and control practice. This is important today, as the accounting profession must deal with a host of complex issues that never existed in the past (Hunton, 2002). Developments in IT will most probably affect many

aspects of business and accounting practice in the future and thereby offer new and exciting research opportunities.

Regarding future developments, the most interesting era seems still to be ahead. According to Moschella (1997), the current network centric era will eventually deliver an inexpensive ubiquitous and easy-to-use, high bandwidth IT infrastructure. Such an infrastructure will be based on a converged computer/communications/consumer electronics industry. It is hypothesized to lead to a content-centric era, where new applications can be designed based on the business and consumer needs, rather than on what is technologically and economically possible. The implications of this development for accounting are yet difficult to predict. Based on the study we may speculate that particularly large changes may not after all take place in the very near future at least as regards the technology itself. The modes of operation are a different question; how people will learn to use the new technologies. On the other hand, who knows what happens in the longer run regarding, for example, Web 2.0 technology, the effects of which have been described by IT and strategy gurus as totally transforming current business models and thus meaning the biggest change in corporate history in the last hundred years.

REFERENCES

- Ahrens, T. - Chapman, C. (2006) Doing qualitative field research in management accounting: Positioning data to contribute to theory. *Accounting, Organizations and Society*, Vol. 31, No: 8, 819-841.
- Anderson, S.W. - Lanen, W.N. (2002) Using electronic data interchange (EDI) to improve the efficiency of accounting transactions. *The Accounting Review*, Vol. 77, No: 4, 703-729.
- Anderson, S. W. - Young, S. M. (1999) The impact of contextual and process factors on the evaluation of activity-based costing systems. *Accounting, Organizations and Society*, Vol. 24, No: 3, 525-559.
- Arnold, V. (2006) Behavioral research opportunities: understanding the impact of enterprise systems. *International Journal of Accounting Information Systems*, Vol 7, No: 1, 7-17.
- Arunachalam, V. (2004) Electronic data interchange: an evaluation of alternative organizational forms. *Accounting, Organizations and Society*, Vol. 29, No: 3/4, 227-241.
- Back, B. - Toivonen, J. - Vanharanta, H. - Visa, A. (2001) Comparing numerical data and text information from annual reports using self-organizing maps. *International Journal of Accounting Information Systems*, Vol. 2, No: 4, 249-269.
- Bancroft, N.H., Seip, H. - Sprengel, A. (1998) *Implementing SAP R/3: How to introduce a large system into a large organization*. Greenwich, CT: Manning Publications Co.
- Becker, A. - Messner, M. (2005) After the scandals: A German-speaking perspective on management accounting research and education. *European Accounting Review*, Vol. 14, No. 3, 417-427.
- Berson, A. - Smith, S.J. (1997) *Data Warehousing, Data Mining, and OLAP*. McGraw-Hill.
- Bhimani, A. (ed.) (2003) *Management Accounting in the Digital Economy*. Oxford University Press.
- Bloomfield, B.P. - Coombs, R. (1992) Machines and manoeuvres: Responsibility accounting and the construction of hospital information systems. *Accounting, Management and Information Technologies*, Vol. 2, No: 4, 197-219.
- Bloomfield, B.P. - Vurdubakis, T. (1997) Visions of organisation and organisations of vision: The representational practices of

- information systems development. *Accounting, Organisations and Society*, Vol. 22, No. 7, 639-668.
- Booth, P. - Matolcsy, Z. - Wieder, B. (2000) Integrated information systems (ERP-systems) and accounting practice – The Australian experience. *Paper presented at the 3rd European Conference on Accounting and Information Systems*, 27-28 March 2000, Munich, Germany.
- Briers, M. - Chua, W. F. (2001) The role of actor-networks and boundary objects in management accounting change: a field study of an implementation of activity-based costing. *Accounting, Organizations and Society*, Vol. 26, No: 3, 237-269.
- Brignall, S. - Ballantine, J. (2004) Strategic Enterprise Management Systems: New directions for research. *Management Accounting Research*, Vol. 15, No: 2, 225-240.
- Britton, C. - Bye, P. (2004) *IT architectures and middleware: Strategies for building large, integrated systems*. Addison-Wesley.
- Byrne, S. - Pierce, B. (2007) Towards a more comprehensive understanding of the roles of management accountants. *European Accounting Review*, Vol. 16, No: 3, 469-498.
- Caglio, A. (2003) Enterprise Resource Planning systems and accountants: Towards hybridization? *European Accounting Review*, Vol. 12, No: 1, 123-153.
- Callon, M. (1991) Techno-economic networks and irreversibility. In Law, J. (ed.) *A sociology of monsters: Essays on power, technology and domination*: 133-161. London: Routledge & Kegan.
- Campbell, S. - Mohun, V. (2006) *Mastering SAP's enterprise services architecture with NetWeaver and mySAP ERP*. Wiley, John & Sons.
- Carruthers, B.G. (1995) Accounting, Ambiguity, and the New Institutionalism. *Accounting, Organizations and Society*, Vol. 20, No: 4, 313-328.
- Castells, M. (1996) *The Information Age: Economy, Society and Culture. Volume I. The Rise of the Network Society*. Oxford: Blackwell.
- Castells, M. (2001) *The Internet Galaxy: Reflections on the Internet, Business, and Society*. Oxford: Oxford University Press.
- Castells, M. - Himanen, P. (2002) *The information society and the welfare state: the Finnish model*. New York: Oxford University Press.
- Chapman, C. (2005) Not because they are new: Developing the contribution of enterprise resource planning systems to management control research. *Accounting, Organizations and Society*, Vol. 30, No: 7/8, 685-689.

- Chapman, C. - Chua, W.F. (2003) Technology-driven integration, automation, and standardization of business processes: Implications for accounting. In A. Bhimani (Ed.) *Management Accounting in the Digital Economy*, Oxford University Press (Chapter 4, 74-94).
- Choe, J.-M. (2002) The organisational learning effects of management accounting information under advanced manufacturing technology. *European Journal of Information Systems*, Vol. 11, No: 2, 142-158.
- Ciborra, C. (2000) *From Control to Drift – The Dynamics of Corporate Information Structures*. Oxford University Press.
- Cooper, R. - Kaplan, R.S. (1998) The promise – and peril – of integrated cost systems. *Harvard Business Review*, Vol. 76, 109-119.
- Cuganesan, S. - Lee, R. (2006) Intra-organisational influences in procurement network controls: The impacts of information technology. *Management Accounting Research*, Vol. 17, No: 2, 141-170.
- Davenport, T.H. (1998) Putting the enterprise into the enterprise system. *Harvard Business Review*, Vol. 76, 121-131.
- Debreceeny, R. - Gray, G.L. (2001) The production and use of semantically rich accounting reports on the Internet: XML and XBRL. *International Journal of Accounting Information Systems*, Vol. 2, No: 1, 47-74.
- Dechow, N. - Granlund, M. - Mouritsen, J. (2007a) Management control of the complex organization – Relationships between management accounting and information technology. In A. Hopwood, M. Shields & C. Chapman (Eds.) *The Handbook of Management Accounting Research*. Elsevier.
- Dechow, N. - Granlund, M. - Mouritsen, J. (2007b) Interactions between information systems and management control. In D. Northcott, T. Hopper & R.W. Scapens (Eds.) *Issues in Management Accounting*, 3rd Edition. Pearson.
- Dechow, N. - Mouritsen, J. (2004) ERP manuscripts of accounting and information systems. In Andersen, V., & Vendelø, T. (Eds.), *The Past and Future of Information Systems*.
- Dechow, N. - Mouritsen, J. (2005) On Enterprise Wide Resource Planning Systems – The quest for integration and management control. *Accounting, Organizations and Society*, Vol. 30, No: 7/8, 691-733.
- Deshmukh, A. (2006) *Digital accounting: The effects of the internet and ERP on accounting*. Idea Group Publishing.

- Dikolli, S.S. - Vaysman, I. (2006) Information technology, organizational design, and transfer pricing. *Journal of Accounting and Economics*, Vol. 41, No: 1-2, 201-234.
- Dillard, J.F. (2008) Responding to expanding accountability regimes by representing organizational context. *International Journal of Accounting Information Systems*, Vol. 9, No: 1, 21-42.
- Dillard, J.F. - Burris, B.H. (1993) Technocracy and management control systems. *Accounting, Management and Information Technologies*, Vol. 3, No: 3, 151-171.
- Dillard, J.F. - Yuthas, K. (2006) Enterprise resource planning systems and communicative action. *Critical Perspectives on Accounting*, Vol. 17, No: 2-3, 202-223.
- DiMaggio, P. - Powell, W. (1983) The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, Vol. 48, 147-160.
- Efendi, J. - Mulig, E.V. - Smith, L.M. (2006) Information technology and systems research published in major accounting academic and professional journals. *Journal of Emerging Technologies in Accounting*, Vol. 3, 117-128.
- Frances, J. - Garnsey, E. (1996) Supermarkets and suppliers in the United Kingdom: System integration, information and control. *Accounting, Organizations and Society*, Vol. 21, No: 6, 591-610.
- Gabriëls, X. (2007) The influence of an ERPS-introduction on organizational structures. *Paper presented at the 30th Annual Congress of the EAA*, Lisbon.
- Giddens, A. (1979) *Central Problems in Social Theory*. London: MacMillan.
- Giddens, A. (1984) *The Constitution of Society*. Cambridge: Polity Press.
- Giddens, A. (1990) *The Consequences of Modernity*. Cambridge: Polity Press.
- Giddens, A. (1991) *Modernity and Self-identity: Self and Society in the Modern Age*. Cambridge: Polity Press.
- Grabski, S.V. - Leech, S.A. (2007) Complementary controls and ERP implementation success. *International Journal of Accounting Information Systems*, Vol. 8, No: 1, 17-39.
- Granlund, M. - Lukka, K. (1998a) It's a small world of management accounting practices, *Journal of Management Accounting Research*, Vol. 10, 153-179.
- Granlund, M. - Lukka, K. (1998b) Towards increasing business orientation: Finnish management accountants in a changing cultural context. *Management Accounting Research*, Vol. 9, No: 2, 185-211.
- Granlund, M. - Lukka, K. - Mouritsen, J. (1998) Institutionalized justifications of corporate action: Internationalization and EU in corporate

- reports. *Scandinavian Journal of Management*, Vol. 14, No: 4, 433-458.
- Granlund, M. - Malmi, T. (2002) Moderate impact of ERPS on management accounting: A lag or permanent outcome? *Management Accounting Research*, Vol. 13, No: 3, 299-321.
- Granlund, M. - Malmi, T. (2004) *Tietotekniikan mahdollisuudet taloushallinnon kehittämisessä* [*The Potential of IT in Developing Accounting Systems*]. WSOY, Helsinki.
- Granlund, M. - Mouritsen, J. (2003) Problematizing the relationship between management control and information technology. Introduction to the Special section on 'Management control and new information technologies', *European Accounting Review*, Vol. 12, No: 1, 77-83.
- Granlund, M. - Salmela, H. (2000) Management in the new millennium: How integrated information platforms leverage integrated management. In T. Reponen (Ed.) *Management Expertise for the New Millennium*, *Publications of the Turku School of Economics*, Series A-1: 2000.
- Hanseth, O. - Ciborra, C.U. - Braa, K. (2001) The control devolution: ERP and the side effects of globalization, *Advances in Information Systems*, Vol. 32, No: 4, 34-46.
- Harney, J. (2002) *Application Service Providers (ASPs)*. Addison-Wesley.
- Hartmann, F.G.H. - Vaassen, E.H.J. (2003) The changing role of management accounting and control systems – Accounting for knowledge across control domains. In A. Bhimani (Ed.) *Management Accounting in the Digital Economy*, Oxford University Press (Chapter 6, 112-132).
- Hopwood, A.G. (1987) The archaeology of accounting systems, *Accounting, Organizations and Society*, Vol. 11, 207-234.
- Hunton, J. (2002) Blending information and communication technology with accounting research. *Accounting Horizons*, Vol. 16, No: 1, 55-67.
- Hunton, J. E. - Gibson, D. (1999) Soliciting user-input during the development of an accounting information system: investigating the efficacy of group discussion. *Accounting, Organizations and Society*, Vol. 24, No: 4, 597-618.
- Hunton, J. - Lippincott, B. - Reck, J. (2003) Enterprise resource planning systems: comparing firm performance of adopters and nonadopters. *International Journal of Accounting Information Systems*, Vol. 4, No: 3, 165-184.
- Hyvönen, T. (2003) Management accounting and information systems: ERP vs. BoB. *European Accounting Review*, Vol. 12, No: 1, 155-173.

- Hyvönen, T. - Järvinen, J. - Pellinen, J. - Rahko, T. (2004) Modernization or success? ERP implementation in the Finnish Defence Forces. *Paper presented at the 27th Annual Congress of the EAA*, Prague.
- Hyvönen, T. - Järvinen, J. - Pellinen, J. (2006) The role of standard software packages in mediating management accounting knowledge. *Qualitative Research in Accounting and Management*, Vol. 3, No: 2, 145-160.
- Hyvönen, T. - Järvinen, J. - Pellinen, J. (2008) A virtual integration – The management control system in a multinational enterprise. *Management Accounting Research*, Vol. 19, No: 1, 45-61.
- Hyvönen, T. - Järvinen, J. - Pellinen, J. - Rahko, T. (2009) Institutional logics, ICT and stability of management accounting. *European Accounting Review*, Vol. 18, No: 2, 241-275.
- Jacobs, L. (2005) *The impact of the changing practitioner requirements on management accounting education at South African universities*. Ph.D. Thesis, University of Pretoria, SA.
- Jones, T.C. - Dugdale, D. (2002) The ABC bandwagon and the juggernaut of modernity. *Accounting, Organizations and Society*, Vol. 27, No: 1-2, 121-163.
- Kallinikos, J. (2006) *The Consequences of Information – Institutional Implications of Technological Change*. Cheltenham (UK): Elgar.
- Knorr-Cetina, K. D. - Cicourel, A.V. (eds.) (1981) *Toward an integration of micro- and macrosociologies*. London: Routledge & Kegan.
- Koskivaara, E. (2004) Artificial neural networks for analytical review in auditing. *Publications of the Turku School of Economics*, Series A-7.
- Latour, B. (1987) *Science in Action*. Open University Press, Milton Keynes.
- Latour, B. (1993) *We Have Never Been Modern*. Harvester Wheatsheaf, New York.
- Law, J. (ed.) (1991) *A sociology of monsters: Essays on power, technology and domination*. London: Routledge & Kegan.
- Lodh, S. - Gaffikin, M. (2003) Implementation of an integrated accounting and cost management system using the SAP system: A field study. *European Accounting Review*, Vol. 12, No: 1, 85-121.
- Lowe, A. (2004) Postsocial relations: Toward a performative view of accounting knowledge. *Accounting, Auditing and Accountability Journal*, Vol. 17, No: 4, 604-628.
- Lozinsky, S. (1998) *Enterprise-wide software solutions: Integration strategies and practices*. Reading, MA: Addison Wesley.

- Macintosh, N.B. - Scapens, R.W. (1990) Structuration theory in management accounting. *Accounting, Organizations and Society*, Vol. 15, 455-477.
- Malmi, T. - Granlund, M. (2009) In search of management accounting theory. *European Accounting Review*, Vol. 18, No:3, 597-620.
- Markus, M. L. - Pfeffer, J. (1983) Power and the design and implementation of accounting and control systems. *Accounting, Organizations and Society*, Vol. 8, No: 2-3, 205-218.
- Markus, M.L. - Tanis, C., & van Fenema, P.C. (2000) Multisite ERP implementations. *Communications of the ACM*, Vol. 43, No: 4, 42-46.
- Mauldin, E. G. - Ruchala, L. V. (1999) Towards a meta-theory of accounting information systems. *Accounting, Organizations and Society*, Vol. 24, No: 4, 317-331.
- McCarthy, W. E. (1982) The REA accounting model: A generalized framework for accounting systems in a shared data environment. *The Accounting Review*, Vol. 57, No: 3, 554-578.
- Moschella, D. (1997) *Waves of Power: Dynamics of Global Technology Leadership 1964-2010*. New York: Amacom.
- Mouritsen, J. - Thrane, S. (2006) Accounting, network complementarities and the development of inter-organisational relations. *Accounting, Organizations and Society*, Vol. 31, No: 3, 241-275.
- Newman, M. - Westrup, C. (2005) Making ERPs work: accountants and the introduction of ERP systems. *European Journal of Information Systems*, Vol. 14, No: 3, 258-272.
- Nicolaou, A.I. - Bhattacharya, S. (2006) Organizational performance effects of ERP systems usage: The impact of post-implementation changes. *International Journal of Accounting Information Systems*, Vol. 7, No: 1, 18-35.
- O'Leary, D.E. (2004) On the relationship between REA and SAP. *International Journal of Accounting Information Systems*, Vol. 5, No: 1, 65-81.
- O'Leary, D.E. (2005) ABB Industries: Implementing SAP's ABC. *Journal of Emerging Technologies in Accounting*, Vol. 2, 1-13.
- O'Leary, D.E. (2006) Microsoft's management reporting: SAP, Data Warehousing and reporting tools. *Journal of Emerging Technologies in Accounting*, Vol. 3, 129-141.
- Orlikowski, W. J. (1991) Integrated information environment or matrix of control? The contradictory implications of information technology. *Accounting, Management and Information Technology*, Vol. 1, No: 1, 9-42.

- Orlikowski, W. J. (1992) The duality of technology: Rethinking the concept of technology in organizations. *Organization Science*, Vol. 3, No: 3, 398-427.
- Palvia, P. - Kumar, A. - Kumar, N. - Hendon, R. (1996) Information requirements of a global EIS: An exploratory macro assessment. *Decision Support Systems*, Vol. 16, No: 2, 169-179.
- Pettigrew, A.M. (1985) *The Awakening Giant*. Blackwell, London.
- Quattrone, P. - Hopper, T. (2001) What does organizational change mean? Speculations on a taken for granted category. *Management Accounting Research*, Vol. 12, No: 4, 403-435.
- Quattrone, P. - Hopper, T. (2005) A 'time-space odyssey': management control systems in two multinational organizations. *Accounting, Organizations and Society*, Vol. 30, No: 7/8, 735-764.
- Quattrone, P. - Hopper, T. (2006) What is IT?: SAP, accounting, and visibility in a multinational organization. *Information and Organization*, Vol. 16, No: 3, 212-250.
- Ribeiro, J.A. - Scapens, R.W. (2004) Power, institutionalism, ERP systems and resistance to management accounting: A case study. *Paper presented at the 27th Annual Congress of the EAA*, Prague.
- Rikhardsson, P. - Kræmmergaard, P. (2006) Identifying the impacts of enterprise system implementation and use: Examples from Denmark. *International Journal of Accounting Information Systems*, Vol. 7, No: 1, 36-49.
- Rom, A. - Rohde, C. (2006) Enterprise resource planning systems, strategic enterprise management systems and management accounting: A Danish study. *Journal of Enterprise Information Management*, Vol. 19, No: 1, 50-66.
- Rom, A. - Rohde, C. (2007) Management accounting and integrated information systems: A literature review. *International Journal of Accounting Information Systems*, Vol. 8, No: 1, 40-68
- Rose, J. - Kræmmergaard, P. (2006) ERP systems and technological discourse shift: Managing the implementation journey. *International Journal of Accounting Information Systems*, Vol. 7, No: 3, 217-237.
- Scapens, R. - Jazayeri, M. (2003) ERP systems and management accounting change: opportunities or impacts? A Research Note. *European Accounting Review*, Vol. 12, No: 1, 201-233.
- Schultze, U. - Boland, R. (2000) Place, space and knowledge work: A study of outsourced computer system administrators. *Accounting, Management and Information Technologies*, Vol. 10, No: 3, 187-219.

- Sedgley, D.J. - Jackiw, C.F. (2001) *The 123s of ABC in SAP*. New York: Wiley.
- Serain, D. (2002) *Middleware and enterprise application integration*. New York: Springer-Verlag.
- Siegel G. - Sorensen J. E. (1999) Counting More, Counting Less. Transformations in the Management Accounting Profession. *The 1999 Practice Analysis of Management Accounting*. IMA.
- Sutton, S.G. (1992) Can we research a field we cannot define? *Advances in Accounting Information Systems*, Vol. 1, No: 1, 1-13.
- Sutton, S.G. (2000) The changing face of accounting in an information technology dominated world. *International Journal of Accounting Information Systems*, Vol. 1, No: 1, 1-8.
- Sutton, S.G. (2004) Editors comments: Rediscovering our IS roots. *International Journal of Accounting Information Systems*, Vol. 5, No: 1, 1-4.
- Sutton, S.G. (2005) The role of AIS research in guiding practice. *International Journal of Accounting Information Systems*, Vol. 6, No: 1, 1-4.
- Sutton, S.G. (2006) Enterprise systems and the re-shaping of accounting systems: A call for research . *International Journal of Accounting Information Systems*, Vol. 7, No: 1, 1-6.
- Thomsen, E. (2002) *OLAP solutions: Building multidimensional information systems*. Wiley & Sons.
- Thrane, S. - Hald, K.S. (2006) The emergence of boundaries and accounting in supply fields: The dynamics of integration and fragmentation. *Management Accounting Research*, Vol. 17, No: 3, 288-314.
- Tuomela, T.-S. - Partanen, V. (2003) Restructuring the accounting function. *Paper presented at the 2nd Conference on New Directions in Management Accounting Research*, Brussels, Belgium.
- Weber, R. (1987) Toward a theory of artifacts: A paradigmatic base for information systems research. *Journal of Information Systems*, Vol. 1, 3-19.
- White, L. (2004) Why look at German cost management. *Strategic Finance*, Vol. 86, No: 3, 6 & 25.
- Willcocks, L. P. - Feeny, D. F. - Islei, G. (1997) *Managing IT as a Strategic Resource*. London: McGraw-Hill.
- Willis, D.W. (2001) Codes for cost management in field-operating organizations. *Journal of Cost Management*, Vol. 6, 37-42.

APPENDIX 1 JOURNALS SPECIFICALLY REVIEWED FOR THE ANALYSIS

Abacus

Accounting, Auditing and Accountability Journal

Accounting and Business Research

Accounting, Organizations and Society

British Accounting Review

Communications of the ACM

Contemporary Accounting Research

Critical Perspectives on Accounting

European Accounting Review

European Journal of Information Systems

Information and Organization (formerly Accounting, Management and Information
Technologies)

Information Systems Journal

Information Systems Research

International Journal of Accounting Information Systems (former Advances in Accounting
Information Systems)

Journal of Accounting Research

Journal of Accounting and Economics

Journal of Business Finance and Accounting

Journal of Emerging Technologies in Accounting

Journal of Management Accounting Research

Journal of Management Information Systems

Management Accounting Research

MIS Quarterly

The Accounting Review

**TURUN KAUPPAKORKEAKOULUN JULKAISUSARJASSA A OVAT
VUODESTA 2008 LÄHTIEN ILMESTYNEET SEURAAVAT JULKAISUT**

- A-1:2008 Maria Alaranta
”This has been quite some chaos.” Integrating information systems after a merger – a case study
- A-2:2008 Maija Vähämäki
Dialogi organisaation oppimisessa. Itseohjautuvan muutoksen mahdollisuus tuotantotyössä
- A-3:2008 Lauri Salmivalli
Governing the implementation of a complex inter-organizational information system network –The case of Finnish prescription
- A-4:2008 Harri Terho
Customer portfolio management – The construct and performance
- A-5:2008 Aki Koponen
Essays on technological development and competition in local bank markets
- A-6:2008 Minna Halonen-Rollins
Customer information usage and its effect on seller company’s customer performance in business-to-business markets – An empirical study
- A-7:2008 Anne Linna
”Se on niin väärin!” Kokemus johtamisen oikeudenmukaisuudesta ja sen muuttaminen kuntaorganisaatiossa
- A-8:2008 Jussi Hätönen
Managing the process of outsourcing – Examining the process of outsourcing product development activities in software firms
-
- A-1:2009 Teppo Rakkolainen
Essays on optimal control of spectrally negative Lévy diffusions in financial applications
- A-2:2009 Murat Akpınar
Understanding primary stakeholders of a firm response to market integration in the European Union – Volkswagen, 1960-2005
- A-3:2009 Johanna Österberg-Högstedt
Yrittäjänä ammatissaan sosiaali- ja terveysalalla – yrittäjyyden muotoutuminen kuntatoimijoiden ja yrittäjien näkökulmasta

- A-4:2009 Samil Aledin
Teenagers' brand relationships in daily life – a qualitative study of brand meanings and their motivational ground among teenagers in Helsinki and London metropolitan areas.
- A-5:2009 Kati Antola
Customer-supplier integration in the forest industry
- A-6:2009 Harri Lorentz
Contextual supply chain constraints in emerging markets – Exploring the implications for foreign firms
- A-7:2009 Pekka Koskinen
Supply chain challenges and strategies of a global paper manufacturing company
- A-8:2009 Tuomo Kuosa
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