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Aernoudts, R.H.R.M.; Boom, T. van der; Vosselman, E.G.J.  
and Pijl, G.J. van der  
Erasmus School of Economics

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# Management Accounting Change and ERP, an Assessment of Research

Roeland H.R.M. Aernoudts\*

Ton H. van der Boom

Gert J. van der Pijl

Ed G.J. Vosselman

Erasmus University Rotterdam  
Rotterdam School of Economics  
Department of Accounting and Finance  
P.O. Box 1738  
3000 DR Rotterdam, the Netherlands

## Abstract

*Extant accounting literature shows that there is increasing research interest into effects of ERP systems on management accounting and control practices (c.f. Granlund, Mouritsen, 2003). This paper provides a review of the literature and identifies knowledge gaps and shows opportunities for research. The review reveals that there are two main streams of research. The first uses a structural approach, while the second uses a process approach. The structural stream adopts a functional approach to technology and is deterministic in nature. It implies the assumption that ERP is the driver of organizational performance improvement. The process approach stream on the other hand seeks to explain how processes of change unfold and how outcomes develop over time (see for example Granlund and Mouritsen, 2001, Granlund and Malmi, 2000, Scapens and Jazayeri, 2003, Caglio, 2003, Quattrone and Hopper, 2004). The focus in this stream is on several different issues, such as hybridization of the accountants' work due to the adoption of ERP and the impacts of ERP on introducing innovative accounting practices. The review of extant literature reveals that there is no cumulative body of research. In this paper several causes for this lack of accumulation are identified. Furthermore, there proves to be very limited coherence among the different studies. Finally, our review shows that although there is some attention for effects of ERP on Management Control, research on this particular subject is still very much lagging behind.*

*We extend our literature review by going through literature from the Information Systems field. It proves that there are some similarities between the two different fields. Based on the findings of our literature review the following recommendations for further research are given: (1) Focus on studying the Management Control aspects of ERP, using a process approach, (2) Build on the results of earlier results of research in Accounting, and (3) Build on the results of earlier research in the IS field.*

Key words: Management Accounting Change, ERP systems, management control theory, Information Systems

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\*Corresponding author

E-mail: [aernoudts@few.eur.nl](mailto:aernoudts@few.eur.nl) Phone: +31 (10) 4081286

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## 1. Introduction

ERP systems have been adopted in a diversity of organizations and the degree of penetration is exceptionally high. The number of ERP adopters is still growing. Recently scholars from the accounting field have, thus, started to address several topics related to the use of Enterprise Resource Planning systems (ERPs) and expected changes these systems bring to accounting and control practices (e.g. Quattrone and Hopper, 2001, 2004, Granlund and Malmi, 2002, Granlund and Mouritsen, 2003, Scapens and Jazayeri, 2003). This paper gives an overview of extant research, examines mutual consistency among research and identifies some research gaps.

ERP systems, often portrayed as integrated information systems, are characterized by a collection of structured integrated software modules covering and supporting most business processes (Hitt et al, 2002, Poston and Grabski, 2001). These systems are modular in the sense that each of the functional modules (e.g. production planning, sales and distribution, financial accounting, human resources) allow for installation at a firms' discretion. The implementation of different modules to support business processes allows for integration of information within an organization. All the data gathered from different processes is stored in one central database accessible from different locations and, thus, allows for new ways of using and disseminating information. Integration stems from the possibility of using one central database. One can simply deduct that the greater the amount of modules that an organization implements, the higher the degree of integration of business processes potentially is. Portrayed benefits from using ERP systems are suggested to be huge (Davenport, 1998, Poston and Grabski, 2001). In several studies ERP has been labeled a prerequisite for doing business (Kumar and Van Hillegersberg, 2000).

The focus of this paper is on this technology specifically while its expected impact might be more fundamental than the impact of other types of information technology (c.f. Kumar, Maheshwari and Kumar, 2003, Granlund and Mouritsen, 2003, Poston and Grabski, 2001, Davenport, 1998). Introducing these systems brings with it the expectation that the information architecture of an organization changes, while these systems open up the opportunity to make information concerning all business processes available throughout the entire organization. The possibility to gather and disseminate accurate and timely information from all business processes has nurtured the idea that this technology could lead to profound changes in the structuring and organization of business processes. Moreover, this technology could lead to profound changes in the control structure of an organization (Quattrone and Hopper, 2004, Sia et al, 2002).

Not all of the proposed benefits (for example the information availability, decision support and tighter integration of business processes), however, that these systems should bring to organizations are attained. Goals set in rational planning processes before the start of the actual implementation of an ERP system are not always achieved (e.g. Hong and Kim, 2002). Some implementations of integrated information systems are flawed, do not succeed, are over budget or not finished within planned time span (Davenport, 1998, Nicolaou, 2004). The loss of resources - money and manpower - when implementations are flawed or fail is huge (Robey, Ross and Boudreau, 2002).

Several scholars from the accounting field in recent published research suggest that ERP systems could also change the logic underlying accounting (Sutton, 2000, Granlund and Malmi, 2002, Scapens and Jazayeri, 2003, Granlund and Mouritsen, 2003). The suggestion is that the logic of accounting will change through increased and real-time availability of information, which enables a complete alteration of how accounting within an organization takes place. Although most researchers suggest there also is a relation between ERP systems and control, the overview of current research shows that research narrowly focuses on the expected changes these systems bring to accounting practices. Extant accounting literature shows several suggestions of when and how ERP systems might influence accounting practices, empirical studies in general nevertheless find that ERP systems only have a limited impact on management accounting (c.f. Scapens and Jazayeri, 2003, Granlund and Malmi, 2002), as for the effects on control there is only limited empirical evidence.

This paper reviews the extant literature on the relationship between ERP on the one hand and management accounting and management control on the other hand. Two main approaches of research are identified: a structural approach and a process approach. The review will reveal that there is no cumulative body of knowledge and that research attention for effects of ERP on *management control* is still lagging behind. Causes for this lack of cumulation and attention will be identified. Based on the findings of our literature review we will make some recommendations for future research.

The remainder of this paper's structure is as follows: The next section presents an overview of research performed in the accounting field focusing on ERP systems, published in accounting journals. Section 3 discusses the most important issues researchers face when studying this technology and discusses the lack of cumulative research. The final section of this paper presents a discussion of the findings of previous research and the meaning of several different theoretical approaches. Several recommendations for future research are made.

## 2. ERP research in Accounting

The overview of ERP research presented in this section is constructed from a selection of papers from highly ranked accounting journals. There are of course several studies related to ERP which touch upon the subject of accounting, which have been published in non accounting journals, but these studies do not qualify as accounting studies as such. The basis for the selection of journals for this overview is based on a journal ranking taken from Lowe and Locke (2005). This ranking list stems from a web survey among U.K. accounting academics and represents high impact journals in the accounting field (see table 1 for the list of journals).

The next step is to search these journals using different databases. In this case three, namely EBSCO-host, ABI-Inform/Proquest and Jstor. The keywords used to search these databases are ERP, Enterprise resource planning, Enterprise resource planning systems, integrated information systems, information systems, control and management control. The selected journals reveal a rather small amount of studies published on ERP. The results of our search were very diverse, all studies included in our overview reported in one way or another on ERP research. Among the results of the search are also papers that report on subjects closely related to ERP, but that do not focus on the effects of ERP. The high impact journals with research published on ERP ordered on amount of papers published are: the European Accounting Review, which had a special issue with a focus on ERP, Management Accounting Research, Accounting Organizations and Society, and Accounting Horizons. The first phase of the search lead to a broadening of the scope of journals included for the overview. The decision was to include the International Journal of Accounting Information Systems, which has a strong link with the accounting field. The selected studies led to interesting findings, which are reported next. What followed from examining these different studies pertaining to ERP is that they allow for a classification in two distinctly identifiable lines of research. This paper focuses within the selected paper on the main issues that receive attention from accounting scholars. Our interest furthermore goes out to the theories underpinning research and research methods in use.

### 2.1 Different lines of research

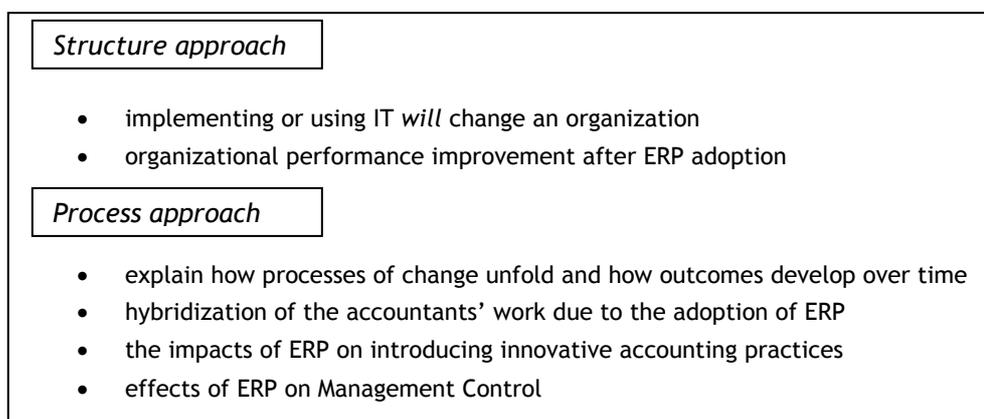
#### *Structure approach*

When we examine current research within this field of scholarly inquiry, two streams are distinctly identifiable. The first stream applies a structure approach to research. This stream of research maintains a rather structural and functional approach to technology and is deterministic in nature. This approach to research implies the usage of the implicit assumption that IT is the driver of organizational change, i.e. implementing or using IT *will* change an organization. This line of research within the accounting field mainly focuses on organizational performance improvement after ERP adoption. The approach to technology is deterministic in the sense that the implementation of ERP leads to predetermined hypothesized outcomes. Information technology is sole driver of change within organizations. The adoption of ERP, thus, forces organizational change. Scholars in this stream attempt to explain variation in the outcome variables by associating those outcomes with antecedent conditions and predictor variables, see for example Poston and Grabski (2001), Hunton et al, (2003), Bradford and Florin, (2003), Hyvönen (2003). Research

methods in use are primarily of a quantitative nature. This line of research related to ERP systems and performance effects studies involves statistical methods. These scholars more or less suggest that the adoption of ERP in each separate case *will* have effects on for example organizational performance. The process of *how* performance is affected is not an issue.

*Process approach*

The other stream that is identified adopts a process approach to research. Process studies are fundamental to gaining an appreciation of dynamic organizational life and to developing and testing theories of organizational adaptation, change, innovation and redesign (c.f. Van de Ven and Huber, 1990: p.213). Scholars within this stream seek to explain how processes of change unfold and how outcomes develop over time (see for example Granlund and Mouritsen, 2001, Granlund and Malmi, 2000, Scapens and Jazayeri, 2003, Caglio, 2003, Quattrone and Hopper, 2004). The focus in this stream is on several issues, such as hybridization of the accountants' work due to the adoption of ERP and the impacts of ERP on introducing innovative accounting practices. Within this line of research previous studies from the accounting field focusing on management accounting change play an important role (e.g. Burns and Scapens, 2000, Scapens and Jazayeri, 2003). Ideas put forward by different accounting scholars (among others Burns and Scapens, 2000, Granlund and Malmi, 2002) on management accounting change are used as a framework for research in several of these studies. Many of the ideas are grounded in institutional theory and provide a frame of reference in these studies allowing for examination of developments and effects of ERP. One research method prevails in this line of research; in use are primarily case studies to examine the effects of ERP adoption in depth. Figure 1 presents a classification diagram of the empirical literature:



**Figure 1 Classification Diagram**

The studies from these two different lines of research included in this overview are first briefly summarized and discussed, as a prelude to the assessment of the differences among studies and their contribution to research focussing on ERP systems.

## 2.3 Structure studies

### *Poston & Grabski, 2001*

A straightforward example of a study pertaining to performance improvement occurring through adoption of ERP is Poston and Grabski (2001) as mentioned before. The study by Poston and Grabski is one of the first studies to appear in the accounting field focusing on ERP. Using large datasets, it analyzes the impact of ERPs on organizational performance. The study focuses primarily on financial metrics and performance improvement after implementation. Hypotheses tested in this study are based on work by Gurbaxani and Wang (1991). Gurbaxani and Wang use agency theory to predict impacts of using information technology on internal and external coordination costs. The availability of information is expected to lower for example the cost of decision making and monitoring of employees. ERP was, thus, predicted to reduce costs by improving efficiencies through computerization and enhance decision-making by providing more accurate and timely data through individual access to enterprise-wide information. These two effects were predicted to improve firm performance. However, the results of the study do not show a significant improvement of organizational performance directly after implementation. This, however, seems to change after a period of three years following implementation. One of the suggestions is that there is a time lag between the actual implementation and the reaping of benefits from the implementation.

### *Hunton et al, 2003*

Hunton et al (2003) is another example, it is a study focusing on performance improvement attributed to the use of ERP. In a sense this study is an extension to the Poston and Grabski (2001) study. The authors approach the impact of ERP on organizational performance improvement from a somewhat different angle. Through a paired matching of 63 firms, this study examines the longitudinal impact of ERP adoption on firm performance. Financial performance of non-adopters decreased over time while performance holds steady for adopters. The authors found that a significant association exists between firm size and financial health for adopters. The study findings suggest that ERP adoption helps firms gain competitive advantage over non-adopters.

### *Hyvönen, 2003*

A study by Hyvönen (2003) compares the use of standalone best of breed (BoB) systems<sup>1</sup> with ERP systems and subsequent effects of both types of systems for management accounting practices. Hyvönen examines whether there are associations between the adoption of ERP and adoption of innovative accounting practices as activity based costing (ABC), activity based management (ABM) and value-based management (VBM). This study is different from others since it also examines the actual motive for ERP implementation. The suggestion is that there are three different reasons for ERP adoption. Implementation of ERP can be interpreted as a development to serve strategic purposes, to serve technical

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<sup>1</sup> Best of breed (BoB) systems are typically information systems supporting one business process and are considered the best in class their subsequent category. The difference between ERP and BoB is the integrative nature of these systems. BoB functions primarily as a standalone application.

purposes, or a combination of both. The results of this study show that in most cases ERP is implemented with strategic and technical motives in mind. The overall results of this study show that there is no significant statistically determined difference between using ERP or BoB systems and the effects on management accounting practices. The results of the study confirm previous findings from the study by Granlund and Malmi (2002) that ERP is not significantly associated with adoption of innovative management accounting techniques.

#### *Bradford & Florin, 2003*

A recent study by Bradford and Florin, (2003) uses a completely different perspective. The study examines ERP implementation success empirically by testing a model derived from two literature streams. These streams are the Diffusion of Innovation stream (DOI) (Rogers, 1983) and the Information Systems Success stream (IS) (Delone and McLean, 1992). The model put forward in this study states that several factors (i.e., innovation, organizational, and environmental characteristics) will influence ERP implementation success both from a firm performance perspective and from a user satisfaction perspective. Seven hypotheses derive from the theories, which are tested using a survey. Fifty-one managers of different functional areas within organizations are the respondents. The results of the survey show that the degree of consensus in organizational objectives and competitive pressure significantly relate to perceived organizational performance. The complexity of the system, training, the competitive pressures faced by the organization, and top management support are significantly related to the satisfaction of functional managers using the systems. Interestingly, post hoc analyses of the results reveal interesting interactions between diffusion of innovation antecedents and user satisfaction. User satisfaction is associated with consensus of organizational objectives of users of the ERP system and top management support, which in turn is associated with perceived performance.

#### *Mauldin & Richtermeier, 2004*

Mauldin and Richtermeier perform an analysis of ERP disclosures in annual reports. The authors compare 453 firms with disclosures to a sample of 236 firms without annual report disclosures on ERP implementation efforts. The assumption is that financial issues and activities surrounding ERP implementations are important to users of financial statements. Investors, according to the authors, need information about ERP implementations pertaining to costs, goals, opportunities and risks. This study is in effect an extension to the Poston and Grabski (2001) study. The study finds significant diversity in current disclosure practice. Firms with capital market transactions, higher performing firms, smaller firms, and firms in the manufacturing industry are more likely to make annual report disclosures, then firms in other industries. The results provide a concrete example that economic theories of the voluntary disclosure decision apply to ERP disclosure decisions in addition to disclosures of management earnings forecasts and broader analysts' disclosures. The study furthermore shows that there is very little descriptive information on how firms implement ERP to help an investor understand the firms' chances for realizing performance improvements with investments in IT.

## **2.4 Process studies**

Within the accounting field several different process studies have been performed. Within this particular line of research, the focus is on effects of the introduction of ERP systems on

management accounting and more specifically accounting and the accountants work<sup>2</sup> (e.g. Scapens and Jazayeri, 2003 Caglio, 2003, Granlund and Malmi, 2001). These studies deal with two issues. Scholars examine accounting changes; introduction of ERP systems might lead to adoption of more innovative accounting practices (e.g. Activity Based Costing (ABC)). Furthermore, scholars examine whether increased information availability in an organization affects the jobs of different organizational actors. These actors are mainly controllers and accountants. The suggestion is that due to the use of ERP systems the reporting or "bean counting" functions of these actors will diminish and more time will be available for performing analytical tasks. These studies allow for two conclusions. One conclusion is that ERP does not in these cases change the logic underlying accounting. Accounting itself does not change dramatically after ERP adoption. The other conclusion is that ERP adoption in several cases leads to changes in the work of accountants. The accountants' job is in some instances becoming more hybrid in the sense that the traditional tasks of the accountant decline - other actors within the organization perform traditional accounting tasks - and the accountants' role is broadening.

#### *Granlund & Malmi, 2002*

One of the first studies that fit in this line of research, which examines effects of ERP on management accounting is a study by Granlund and Malmi (2002). Their research is the result of an analysis of ten field studies concerning Finnish firms, which have implemented ERP. The focus of the study is on ERP systems and the effects of implementation for management accounting and the management accountants' work. Although the authors primarily examine these effects, they present some notions of how ERP will affect management control. A broad view on management accounting guides this study. What is notable is that the analysis concerns two perspectives; the authors acknowledge that there is both a technical and a social angle to management accounting systems, which together constitute a complex socio-technical whole. Institutional theory informs this study in the sense that management accounting practices and changes therein can be explained through their institutionalized nature (Burns and Scapens, 2000). The authors apply an institutional framework based on old institutional economics. The framework is adopted from DiMaggio and Powell (1983) and Granlund and Lukka (1998). A secondary goal of the study is to assess whether ERPs change added value from Management Accounting Systems (MAS) for decision-making and control. These authors also examine whether the new systems affect the budgetary process and performance measurement.

Changes in the organizational structure and lines of responsibilities were observed. The methods of control were however not affected. What the authors found was that based on the empirical evidence, impacts ERPS have on access to information appears inconsistent. Although ERPS seem to have a limited impact on the measurement systems in use, accountability and control in organizations may change due to the impact of ERPS on the organizational structure or the division of tasks between the units. Using ERP systems information can be made available in different parts of an organization. This allows for the choice to centralize or decentralize decision making, which in turn leads to a different organizational structure. By centralizing or decentralizing decision-making, accountability

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<sup>2</sup> These studies adopt an Anglo-Saxon approach to management accounting and the management accountants' work, which entails both the internal and external accountant.

for decisions also changes. The authors further go on to argue that the relatively small impact ERPS have on management accounting:

*“Can best be explained in economic terms (e.g. system complexity and a lack of resources), whereas institutional factors seem to play a smaller role in this context”* (Granlund and Malmi, 2002: p. 302).

The argument, which forms the basis of this statement, is that the resources (people, amount of time and effort) necessary for fully implementing an ERP system often exceed the available capacity. The complexity that is inherent to an ERP system furthermore increases the need for resources. This leads the authors to believe that economic factors play a more dominant role than institutional factors when implementing ERP systems. The organizational structures in place in some of the organizations in this study have changed, but control and the means to implement control, accounting, did not change. No innovative accounting practices were introduced.

In sum, minor effects were found on existing control systems, for which several possible interpretations are given; ERPS may actually only have a stabilizing effect on management accounting practice and its development. The suggestion is that instead of analyzing effects only in terms of changes, also it is also possible to identify effects in terms of whether a new technology maintains prevailing practices. The authors go on to conclude that, based on this study, it seems that overall ERPS are not driving the adoption of new accounting and control techniques. They go on to suggest that this may change, through the introduction of Strategic Enterprise Management (SEM) modules.

#### *Scapens & Jazayeri, 2003*

A study by Scapens and Jazayeri (2003) can be interpreted as an extension of the above study. Scapens and Jazayeri present findings from a longitudinal case study of the implementation of SAP in the European division of a large US multinational. This study argues that characteristics of SAP, a specific ERP package, opened up opportunities and facilitated changes, which were already taking place within the company. Specifically, its integration, i.e. the tight coupling of business processes and subsequently information in use for these processes; standardization, i.e. the standardization of business processes according to best practices in line with the ERP system, routinization of practices and centralization of decision making. These scholars provide a more in depth examination of one of the reasons presented by Granlund and Malmi (2002), that *“ERP systems may play a stabilizing role, reinforcing the existing management accounting routines”* for only finding ‘moderate’ effects of ERP systems on management accounting and control system characteristics. The management accounting change framework (Scapens, 1994 and Burns and Scapens, 2000) guides this study, which interprets management accounting as organizational routines. The main idea is that:

*“Management accounting practices can be conceptualized as organizational routines that encode the existing institutions within the organization. A distinction is drawn between rules and routines, whereby rules are the formal procedure guides set out in organizational manuals and other similar*

*documents, whereas routines are the practices which implement those rules on a day-to-day basis” (Scapens and Jazayeri, 2003: p. 211).*

Results of the study indicate that ERP enhanced routinization of accounting. Adoption of the ERP system can then be interpreted as a layer that is added to the existing organizational rules in place. These rules are already embedded within the organization and ERP enhances the embedding of rules as organizational routines. Because of the integrated nature of SAP and its process-oriented structure, teamwork became more important. Users needed to work together and modify working practices. ERP also raises the possibility of greater centralization of information processing activities. The networking of computers and standardization of much routine information processing allows for centralization of tasks at locations quite separate from other day-to-day activities of the business.

These scholars perceive the introduction and adoption of ERP to lead to evolutionary rather than revolutionary changes in management accounting as managers and accountants found new ways of working with the new system. The overall constitution of ERP modified existing organizational routines. The adoption of the SAP ERP system lead to incremental changes as opposed to fundamental changes in the ways people work. It enabled and encouraged teamwork and cross-functional cooperation. Tighter linkage of business processes over functional departments was enabled by the integrative nature of SAP. Routine jobs normally performed by accounting staff were computerized. Line managers became more knowledgeable in the sense that through the altered accountability (real responsibility for budgets, variances and forecasts) they gained more accounting knowledge.

#### *Caglia, 2003*

Caglia (2003) like Granlund and Malmi (2002) examines the changing role of the management accountant within organizations, due to the use of ERP systems. The study reports on an in-depth case study at an Italian medium-sized firm, which has adopted an ERP system. This case study presents some interesting notions on ERP adoption. The firm in this study was chosen because it implemented a complete ERP system, not just some ERP modules. The argument that the author presents for studying a complete implementation is that a review of relevant literature shows this to be an important factor that influences the magnitude of the impact of the system on existing organizational practices. The main issue of this study is the idea that through availability of more information and codification of accounting knowledge enabled with ERP different jobs within the organization may become more hybridized (jobs of accountants, IS and line people). IS and line people may acquire accounting knowledge, so that routine accounting work can also be performed by these people. Accountants require less time for reporting functions, because these tasks have mainly been automated. This gives the accountants the option to focus more on business analysis.

The description of the case study reveals that the motive to introduce ERP in this organization is primarily technical in nature, whilst the main weakness of the firm was represented by its legacy information systems. Control is however again implicitly one of the factors of interest. The implicit motive for implementing ERP within this organization is control and the way control is effectuated through accounting information. Several explicit

motivations, which are also of a technical nature, serve to create consensus within the accounting department to adopt ERP. These were in no particular order the low quality of accounting information, need for costs reduction of transactional processes, difficulties in managing financial statements and the internal reporting and an urgency to offer to 'internal customers' a real service of support for their day-to-day activity as well as strategic decisions.

For the analysis of findings from the case study, this author applies the structurational model of technology developed by Orlikowski (1992) - which in turn is based on Giddens' (1976) theory of structuration - to provide insights into the consequences of ERP systems for accountants. The structuration model comprises three main components: (1) human agents, (2) technology, and (3) the institutional properties of organizations. The essence of this model is that the three components interact. In this structurational model, the focus is on the dialectic relationship between new information systems and its users. In this model IT is an external force, which is mediated by human agents and their socio-organizational background. This complex constitution of human actors, - with their norms and behaviors - their actions and structures influences the outcome of change processes within organizations. The structurational model of technology contrasts the technological imperative paradigm - where information technology is perceived as the driver of change, i.e. information technology *will* change organizations - in which a traditional functional approach to technology dominates. The authors argue based on structuration theory that ERP systems have embedded interpretative schemes. Through a process of structuration these schemes may lead to a new structure in which new practices and new positions are enacted. In this sense ERP systems thus provide new shared rules and concepts, which are drawn upon to manage organizational activities.

In concurrence with the ERP implementation a project focusing on redefinition of processes within the accounting department was launched. What the case study also shows is that justification of the ERP project and the way the project is embedded within the organization plays a significant role. The ERP system was introduced in the organization as an enabler that would allow the firm to successfully thrive in the future. Presenting the ERP system to the organization as a means that would allow the firm to adopt new working processes engendered participation. Important within the implementation process was that significant aspects of social conduct were redefined. Communication practices, organizational norms and role expectations were transformed.

The CFO and the accounting department were given a dominant role in the implementation project. Caglio states that ERP became the medium to control and coordinate organizational activities within the firm. This occurred through adopting a process view of the firm - supported by ERP - in which the need for interfunctional collaboration is a necessity. During the implementation process the role of the CFO and the accounting department were redefined. This process was enabled by ERP and lead to a new power structure, a new structure of legitimation and domination.

In conclusion the author found that the role of the accountant became more hybrid and link this effect to ERP. The ERP system according to these authors provided modalities of

structuration that enabled the process of hybridization. Caglio also notes that hybridization of the accountants' role is strongly dependent on the socio-organizational context. However, when we take into account the limitation that one of the explicit goals of the project - next to implementing ERP - is a redefinition of the role of the accounting department then the link between ERP and a hybridization of the accounting role is less clear. This does however not exempt the fact that ERP indeed may have a strong impact through structuration.

Notable is that - despite calls by several scholars - existing accounting research seldom pays attention to the management control dimension when studying management accounting and ERP. Although some studies have started to appear in accounting journals as *Accounting, Organizations and Society* and *Management Accounting Research*.

Granlund and Mouritsen (2003: p. 79) put it very eloquently by stating that:

*"There tends to be a lack of questions such as how precisely technology drives management control logic, and how management control problems drive information technology solutions".*

There are however some noteworthy exceptions that do actually study management control and the effects of ERP systems, although not always explicitly. Several studies examine the different aspects of ERP systems and their specific effects on control. The study by Granlund and Malmi (2002) has some notions of how ERP systems can affect management control. These notions, however, remain mainly implicit.

#### *Quattrone and Hopper, 2004*

One of the studies from the accounting field which is an explicit exception to the previous statement that there is little research attention for effects of ERP on management control and which contrasts the previous studies is a study by Quattrone and Hopper (2004). The focus of this study is less on accounting and more on effects of ERP on control. These scholars study the effects of implementing ERP in two multinational organizations (MNO's), respectively *Think Pink* and *Sister Act*. In this study institutionalism and the conceptualization of management accounting change as described by Burns and Scapens (2000) again plays a major role, similar to the study by Granlund and Malmi (2002). The associations between the introduction of ERP, management accounting, management control, and its institutional nature are woven together by these authors. The possible effects of the adoption of ERP are linked to control through a complex process of institutionalization:

*"The research issue in large organizations is not identifying where centers of power and control do and should reside but rather tracing how control is related to integration and establishing order into work activities. This is a complex process involving inscriptions, translations, beliefs, mediation, accounting, and information processing technologies, as previous work in this vein illustrates." (Quattrone and Hopper, 2004: p.27).*

One of the most important benefits organizations hope to achieve from their ERP projects is in essence integration of information and with that integration of business processes. This specific property of an ERP system is then linked to control. It directly affects the organization of work processes and the way control is effectuated within an organization. The process by which integration becomes an integral part of organizational routines is through inscriptions. The authors describe inscriptions as referring to "*all the types of transformations through which an entity becomes materialized into a sign, an archive, a document, a piece of paper, a trace*" (2004: p.6). As an example Hopper and Quattrone (2004) name a double entry record in an account an inscription. Likewise, an ERP system has its own particular inscriptions. It may be that the inscriptions present in an organization need to match the inscriptions of an ERP system. The goals set for the ERP implementation and the organizational routines present in an organization seem to influence the actual outcome of the adoption process, which also becomes clear when examining the case studies of the MNO's.

What is particularly interesting in this study is that the two MNO's within the study had different reasons to implement and adopt ERP. The justification to implement ERP and the goals with which ERP is implemented seems to have had a direct effect on the outcome and effects of adoption. In *Sister Act* ERP lead to reproduction of previously existing structures. The existing organizational structure was kept intact, permitting conventional accounting controls in place to be maintained. The reason to implement and adopt ERP in *Sister Act* was a practical one. Actual implementation of ERP was driven by changes in legal regulations, which required a different emphasis in the reporting structure of the MNO. The purpose for which ERP was adopted was to facilitate group consolidation of 18 subsidiaries through ERP with its shared database. The adoption of ERP in this organization was an extension of existing information systems development projects. One could argue here, that the inscriptions of the ERP system were in alignment with existing organizational rules and routines.

In the other MNO, *Think-Pink*, the reason to implement ERP was of a different more abstract order, the goal of adopting ERP was to integrate business processes through business process reengineering. On the organizational side there was another goal, the creation of a matrix structure within the organization. The outcome of the adoption of ERP within *Think-Pink* was very different since the adoption of ERP and its inscriptions produced constantly changing loci of control and managerial feelings of minimalist control. What this study also shows is that the effects of implementing ERP on management control can differ per organization.

#### *Nicolaou, 2004*

Nicolaou examines the process of ERP system reviews during the post implementation stage, also known as the post implementation review (PIR). The study starts of with identifying and determining factors of importance when implementing ERP from a review of the literature. The author links post implementation reviews to the actual success of the implementation through several factors identified in the review. Nicolaou then utilizes a case study approach to examine the concept of PIR and its' potential importance for ERP system implementations in two different organizations. Insights from the case studies were

subsequently used to conceptually define the construct of PIR quality. The study concludes with a research model that could be useful in future empirical investigations. The model proposes several potentially important conditions that influence the extent to which an organization attains desired outcomes from an ERP implementation.

### 3. Assessment of ERP research in accounting

Several challenges emerge when examining current research. This section gives an account of these challenges and gives several suggestions on how to resolve them. The goal of the assessment of extant research is to try to identify existing knowledge gaps and raise questions for future research.

#### 3.1 Issues in Research

A first examination of the studies discussed in this overview reveals several basic issues that require a preliminary discussion. What is clear is that the concept of ERP has different connotations, which are in turn based on different perceptions. Several authors in their respective studies raise the question of how to define ERP (e.g. Granlund and Malmi, 2002, Hyvönen, 2003). Application of an ERP definition differs dramatically in these studies, which directly leads to pose the question as of how to define ERP. Logically, applying different definitions of ERP leads to differences in the results that studies report. Using a broad or narrow definition of ERP has several inherent problems.

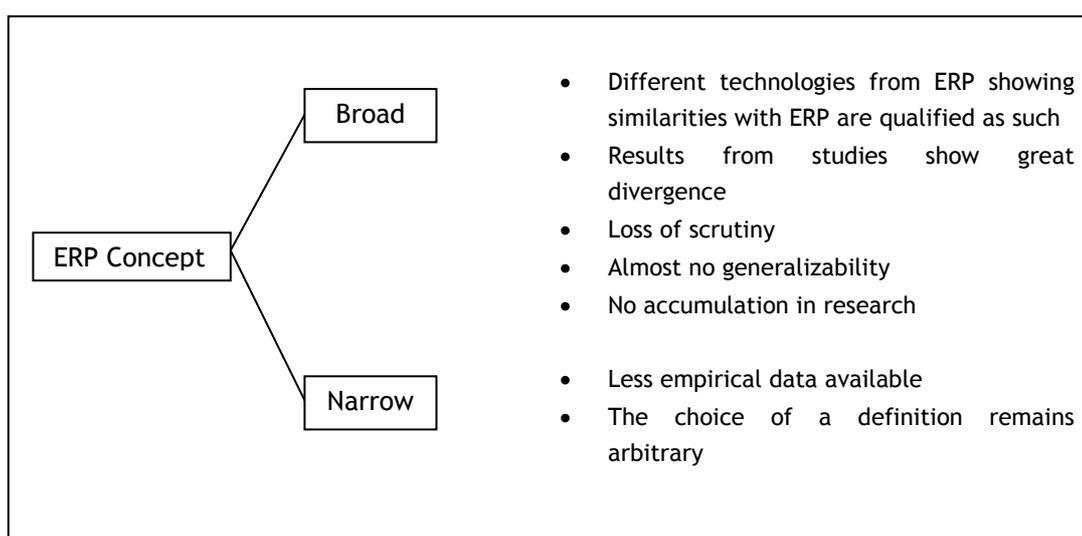


Figure 2 the ERP Concept

The main point one should keep in mind when studying effects of ERP is that subsequent effects expected on accounting are dependant on the very nature of how one defines and perceives an ERP system. Without an eye for this particularity, outcomes of studies will differ significantly. Granlund and Malmi (2002: p. 304) look at the ERP property of system integration, stating that:

*"In general, the level of system integration can be said to be a continuum. In cases where a company implements only some modules of the ERPS, it is*

*somewhere in the middle of the continuum that goes from a collection of stand-alone systems to a wholly integrated system.”*

However, the integration aspect related to ERP needs some further elaboration. The properties and requirements of ERP differ from the properties and requirements of standalone systems that link together through interfaces. A specific property of ERP is that it is process oriented; it should enable transformation of an organization from a functional to a process oriented enterprise. Whereas implementing standalone information systems primarily supports the traditional functional orientation of an organization. To fully reap the benefits and to achieve integration of information throughout the enterprise a necessary condition is that most or all business processes are supported by ERP. Processes should thus be standardized and integrated.

We submit that relevant aspects in defining ERP are the following: (1) integrated information systems, which allow for integration of information within an organization and that are (2) characterized by a collection of structured integrated software modules covering and supporting most business processes, (3) modular in the sense that each of the functional modules (e.g. production planning, sales and distribution, financial accounting, human resources) allow for installation at a firms' discretion, (4) All the data gathered from different processes is stored in one central database accessible from different locations (5) which allows for new ways of using and disseminating information and which (6) are process in stead of functionally oriented and (7) which are single vendor based.

An ERP system in most cases requires redesign of business processes, a requirement for seamless integration of data and business processes. Not defining ERP correctly, leads to the simple fact that effects of ERP on accounting cannot fully be understood, nor discerned in a discriminating way from implementations of other types of information systems. Of interest here is that when performing a pilot study at a bank as a follow up to this review, from rhetoric it seemed as though the bank had implemented an ERP system. However, after closer examination of the implementation, it was clear that the bank had only implemented a single module, the accounting module, of the complete ERP package. Logically so, implementing only one module of an ERP package does not constitute as having an ERP system being equal to having a stand alone information system.

### **3.2 A common body of knowledge**

From the overview of current literature, it is also apparent that scholars use different perspectives to identify changes ERP systems bring to accounting and control practices. The application of different interpretative schemes to evidence logically influences the replicability and comparison of the outcomes of research findings. Table 2 presents an overview of research questions, related to a broad or narrow definition of ERP, different interpretative schemes in use to interpret research findings and applied research methods. It is noteworthy that the interpretive schemes in use in several of the case studies have the same groundings in theory. Some of the case studies have a whiff of new institutional economics. However, the (slight) differences among interpretive schemes make comparing research findings a difficult task. Scholars, thus, do not build on each others research findings.

The aggregation level that researchers apply also differs. Some scholars use a division of an MNO for their case studies, others examine the effects of ERP in an entire MNO, or the study is performed in an SME. Logically the use of different levels of aggregation has an effect on the different findings that are reported.

As is evident from table 2, research methods in use also differ. For the process approach, the *case study methodology* dominates. The fact that this qualitative method dominates is not strange, while this field is still in its infancy and the case study methodology seems to be a preferred tool to chart a new field of scientific exploration (Otley, Berry, 1994). The case study methodology fits the research questions posed and the research domain that is subject of inquiry. That is, research questions focus on antecedents or consequences - *the how and what* - of processes of organizational change. These studies in essence perfectly fit Yin's (1994) definition of case studies: "*An empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.*" The boundaries of research into ERP systems and its' effects on management accounting are not clear, and a thorough understanding of the processes that occur demands a contextual approach. The case study method also serves its purpose well under the given circumstances, while it allows for the generation of new hypotheses and building, testing and refinement of new theories (Eisenhardt, 1989, Ryan, Scapens and Theobald, 2002). What is also a clear difference is that research employing the case study method shows significant differences.

However, this also immediately calls to mind one of the often-mentioned critiques and one of the possible shortcomings in current research. Case studies do not easily allow for generalization of research findings to other circumstances, although that there are methods available that allow for theoretical generalization from (single) case studies (e.g. Leonard-Barton, 1990). Furthermore, although there are many case studies available that present opportunities to build theory or derive new hypotheses, there is no real tradition in the accounting field to build on previous findings from case studies.

### **3.3 Management Control Dimensions**

What is evident from the overview presented here is that a large part of the research focusing on accounting and ERP tends to ignore management control dimensions. Granlund and Mouritsen (2003) for example, express that this particular field of research is still an empirically underdeveloped area, however, more and more case studies start to appear that show that the use of ERP has several implications for Management Control .Some studies only find limited effects of ERP on MC; however, other studies present findings that stand in stark contrast to this. Quattrone and Hopper (2004) express explicitly that there is an association between configuration of ERP and control. Dechow and Mouritsen (2005: p. 40-41) assert in their study which focuses explicitly on effects of ERP on control, that ERP has effects on control:

*"ERP systems make separated versions of control mutually dependent and management control becomes a collective affair"*

More importantly they also assert that:

*“Control cannot be studied apart from technology and context”*

A particularly problematic issue then, when performing research into effects of ERP on Management Control, is how to define management control. In fact, what is clear from the different studies performed is that the terms ‘control’ and ‘management control’ have a large amount of different connotations.

A brief review of the accounting literature shows that many scholars discuss definitions of MC - and the scope of these definitions - to ascertain what should be categorized under its umbrella. Terms in use to define management control (MC), management control systems (MCS) and organizational controls (OC) are sometimes used interchangeably (Chenhall, 2003). An abundance of definitions aspire to describe what management control effectively is. As for example Otley and Berry state (1980: p.231): *“Control is a term with more different shades and nuances of meaning than almost any other in the English language.”* Otley (1999, p. 364) even asserts that in the eighties management accounting became largely synonymous with management control. It is thus a necessity to provide a clarification of what and how the term management control is applied in the context of studies performed in accounting that focus on effects of ERP. Within the accounting field several authors prefer to apply a *functional* definition of management control, leaving the properties of management control *activities and processes* an open question (Anthony, 1965, 1988, Fisher, 1995). Management control then is *“the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of an organizations’ objectives”* (Anthony, 1965), or *“the control managers exercise over other managers”* (Fisher, 1995). Others adopt definitions in terms of the activities and processes management control is supposed to include. For instance Alvesson and Kärreman (2004: p.423) who define MC as typically including *“an apparatus for specifying, monitoring and evaluating individual and collective action. It focuses on worker behaviour, output and/or the minds of the employees. Sometimes it attempts to focus on all three”*. Otley and Berry (1980: p.235) put forth the argument that applying a definition that is not functional, but activity-oriented (which in fact is a narrow definition) *“leaves an emaciated concept of management control which may have been valuable as an initial strategy, but is a present embarrassment in implying an over-narrow view of the management control process.”*

What is evident is that research into effects of ERP on management control forms the mirror image of the debate on what management control effectively is in the more general field of accounting research. Some authors examine effects of ERP on ‘*traditional accounting controls*’, (e.g. Caglio, 2003 Granlund and Malmi, 2002). Other scholars, like for instance Quattrone and Hopper (2004) use another interpretation of the term control and examine control from the perspective of ‘*centre*’ and ‘*periphery*’ and how control is related to integration and establishing order into work activities.

Without extending too much on - and unnecessarily repeating - several prior discussions on how to define MC; a broad and functionally orientated definition seems the more logical choice when studying ERP. The main argument for this choice is that adopting a narrow

definition would lead to narrowing the scope of research and running the risk of leaving out important findings. Therefore, it would be wise to choose to define management control as the influence managers' exercise over other members of an organization in order to improve the effectiveness and efficiency of the organisation at large. Adopting a functionally oriented definition of management control permits to review several of its features related to the adoption, development and use of ERP-systems. In doing so, studies will go beyond aspects of operational control, which supports the day-to-day operations within an organization and which intuitively has a more direct relation with ERP-systems, the latter being fundamentally transaction-oriented systems.

#### **4. Management accounting and ERP: conclusions and recommendations**

Extant research into the relationship between ERP and management accounting/management control shows a variety of theoretical and methodological perspectives, leading to rather fragmented knowledge on the subject. The low degree of knowledge accumulation is further augmented by different conceptions of an ERP-systems as well as of a management control system by different researchers. Therefore, although we now know that management accounting and control change and the implementation of ERP are interrelated, we still do not possess much knowledge on *how* they are related. In view of this we strongly suggest research that builds on prior research.

One of the important shortcomings of extant research is that it primarily focuses on the implementation phase and presents this phase as characterized by a rational decision process. The justification, legitimization and adoption processes that occur before, during and after implementation scarcely receive attention. The only exceptions examining the different phases are the study by Hyvonen (2003), who looks at the reasons for adopting ERP, and the recent study by Nicolaou (2004), who studies at post implementation reviews. Processes of justification, legitimization and adoption and respective interactions need to be studied in order to acquire a fuller understanding of the nature of the changes that actually occur when ERP systems are adopted.

Another shortcoming of extant research is the lack of emphasis on management control issues.

In order to enhance our knowledge on the subject, several authors suggest informing accounting and control research by research results from other fields (c.f. Hunton, 2002, 2003, Granlund, Mouritsen, 2003). Several studies into effects of ERP from another field of scholarly inquiry, the Information systems field, show also diversity in findings. Furthermore, some findings stand in stark contrast to what is reported in studies from the accounting field. How accountability and control changes occur when ERP is adopted has not previously been studied in depth. Several scholars report that the adoption of ERP in most cases has only limited effects. Whilst several scholars from the accounting field have called for research into the ERP phenomenon, none have looked over the "fence". Although there is some paucity in empirical data, scholars do not look at other fields of scholarly inquiry, where studies have already been performed. The call by several authors to integrate research from different fields to acquire new insights, gave rise to the idea that

there is actually a field of research which shares some commonalities with the accounting field.

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Theme of the study	Author(s)	Approach	Theoretical perspective	Research Method	Sample size	ERP Definition
- Organizational performance improvement through ERP adoption	Poston and Grabski (2001)	Structure	Hypotheses tested primarily derived from agency theory (Jensen & Meckling, 1973 and work by Gurbaxani & Wang, 1991)	Quantitative statistical analysis	50 firms	Broad definition, author term "ERP technology"
- Organizational performance improvement through ERP adoption	Hunton et al, (2003)	Structure	Extension of the Poston and Grabski (2001) study, relationship between ERP investment and financial performance	Statistical analysis of longitudinal data	Paired matching of 63 firms	Broad definition, author term "ERP technology"
- BoB Systems vs. ERP and effects on adoption of innovative accounting practices	Hyvönen, (2003)	Structure	Hypotheses derived from prior studies performed by Granlund and Malmi, Burns and Scapens 1999	Quantitative statistical analysis		"units with at least some of ERP system, are counted as group of ERP adopters", only accounting module adopted
- ERP implementation success	Bradford and Florin, (2003)	Structure	Diffusion of innovation theory adopted from Rogers ( DOI) (Rogers, 1983) and Information Systems Success (Delone and McLean, 1992)	Quantitative statistical analysis of data collected through a survey	51 managers responded to the survey	No definition given
- Disclosure of information on ERP implementation	Mauldin and Richtermeier, (2004)	Structure	Information availability on costs and risks associated with ERP implementation are important to users of financial information	Quantitative statistical analysis	453 firms disclosing and 236 firms not disclosing information on ERP implementation	No definition given
- Differences found in effects on control after implementing ERP - Accounting perceived as organizational routines	Quattrone and Hopper, (2004)	Process	Sociology of translation, distance between the controller (center) and the controlled (periphery) (Callon, 1981, 1986, Latour, 1987, 1999)	Case study	One Japanese and one American multinational organization	Narrow definition: Single ERP system: "the configuration of the implementation may have subsequent effects to materialize"
- Changing role of management accountant and accounting itself due to the use of ERP systems - Changing role of the use of control instruments as budgetary/performance systems	Granlund and Malmi, (2002)	Process	Institutional theory based on DiMaggio and Powell (1983), Granlund and Lukka (1998), Burns and Scapens (2000)	Exploratory field study	Ten Finnish firms	Broad definition: In case company implements one or more modules of the ERPS, it is somewhere in the middle of a continuum that goes from a collection of stand-alone systems to a wholly integrated system. The study also contains a narrow definition: The study also contains a narrow definition: Single ERP system that supports major business processes
- Effects of ERP systems on management accounting and in part control system characteristics	Scapens and Jazayeri, (2003)	Process	Management accounting change framework based on Burns and Scapens (2000) Change as an evolutionary rather than a revolutionary process	Longitudinal case study	One division of a large US multinational organization	Narrow definition: Single ERP system that supports major business processes
- Changing role of the management accountant, due to the use of ERP systems	Caglio, (2003)	Process	Structuration theory based on work by Orlikowski (1992) and Giddens (1976)	In depth case study	Italian medium sized firm	Narrow definition: Single ERP system that supports major business processes

Table 2

<b>Table 1 Journals included in selection</b>
Accounting, Organizations and Society
The Accounting Review
Journal of Accounting Research
Journal of Accounting and Economics
Contemporary Accounting Research
Auditing: A Journal of Practice and Theory
Accounting and Business Research
Journal of Business Finance and Accounting
Accounting, Auditing and Accountability Journal
Journal of Management Accounting Research
Management Accounting Research
Review of Accounting Studies
Critical Perspectives on Accounting
Journal of Accounting and Public Policy
Journal of Accounting Literature
Accounting Business and Financial History
Behavioral Research in Accounting
Journal of Intl Financial Management & Accounting
Abacus
Financial Accountability and Management
Accounting Horizons
Journal of Accounting, Auditing and Finance
The European Accounting Review
The British Accounting Review
Journal of Accounting Education
Accounting and Finance
Issues in Accounting Education
Accounting Education: An International Journal
The International Journal of Accounting

