MANAGEMENT CONTROL IN ENTERPRISE SYSTEM ENABLED ORGANIZATIONS: A LITERATURE REVIEW

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Abstract

The objective of this paper is to add to the limited body of knowledge on the relationship between enterprise systems (ES) and management control. Based on a literature review, we describe and classify studies that empirically address this relationship. Apart from not being extensive, the research done so far primarily addresses the relationship between management control and ES based on a limited number of methodologies and approaches. We argue that there seems to be a need for more research done from functionalistic and critical perspectives, as well which employs a greater variety of methodologies. Subsequently, we propose some avenues for future research.

Keywords: ERP, management control, management accounting

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Introduction

Few IT innovations have had as much impact on business organizations in recent years as enterprise resource planning (ERP) systems. Today, virtually every major business has implemented one or more ERP systems. It is estimated that organizations worldwide spend approximately USD18.3 billion every year on ERP systems (Shanks et al., 2003). Therefore, the management and organization of ERP technology and the innovative use of ERP systems are considered in almost any business context (Møller et al., 2003).

It has been argued that relatively few studies have looked at the relationship between enterprise systems (ES), enterprise systems enabled organizations and management control (Granlund and Mouritsen, 2003; Sutton, 2005). This seems paradoxical given the apparent importance of ES. It also seems that research is very much needed given developments within management control in the advent of, for example, the Sarbanes Oxley Act in the US, changes in international accounting standards and the increased responsibility of external auditors to validate internal control systems.

The main objective of this paper is to add to the limited body of knowledge of the relationship between ES and management control. To do this, we describe the empirical studies which have looked at the effect of enterprise systems on management. We then tentatively make conclusions concerning the current state of knowledge regarding the effect of enterprise systems on management control and propose avenues for future research.

Defining management control and enterprise systems

Enterprise systems and enterprise system enabled organizations

ERP systems are modular systems based on a client/server technology and offer comprehensive functionalities that support and integrate most business processes, such as accounting, sales, purchasing and production. Apart from internal integration, these systems offer the possibility of integration with external business partners such as customers and vendors (Klaus et al., 2000). Data are stored in a single database, which eliminates redundancy and the need to update data in several different subsystems (Davenport, 1998).

While the focus of ERP systems is mainly on the operational and tactical level, Fahy (2000) argues that they lack comprehensive reporting and analysis functionalities at the strategic level. Rom and Rohde (forthcoming) argue that ERP systems are in effect giant "calculation machines" and are mainly

developed to process transaction information. As such, these systems have, in the past, been somewhat less successful in processing and reporting this information for the support of the various decision making processes in the organization. This is changing, however, with the advent of what are called business analytics and reporting (BAR) applications, which include various analytical applications such as balanced scorecard, budgeting and consolidation applications. BAR applications are linked (often through a data warehouse) to the transaction processing "engines" of the ERP system (Brignall and Ballantine, 2004). It should be noted that our definition is somewhat similar to Brignall and Ballantine's (2004), who talk of strategic enterprise management (SEM) systems. However, in order to avoid any confusion with SAP's product suite, which has the same name (SAP, 2004), we prefer the term business analytics and reporting systems or BAR systems.

Only five years ago, BAR systems were often found as add-on applications to ERP systems sold by third party vendors (i.e. non-ERP system vendors), including for example, Siebel, Cognos, QPR, SAS institute and Hyperion. Established ERP vendors did not allocate much attention to this area and focused more on the transaction functionalities of their systems. This is changing, however, as vendors release suites of BAR functionalities in their systems, such as SAP's Strategic Enterprise Management suite and Intentia's Enterprise Performance Manager. SAP SEM, for example, is a suite containing modules of Business Planning and Simulation, Business Consolidation, Strategy Management, Performance Measurement and Stakeholder Relationship Management (SAP, 2004).

ERP systems today are thus a combination of transaction registration and processing technologies and information extraction and reporting technologies – either from an ERP vendor or from an ERP vendor combined with software from a third party vendor. The term "enterprise system" (ES) will hereafter be used to refer to this combination. It does not include, for example, spreadsheets as these are not standard systems and are not an integrated part of the system. However, applications like Cognos and Hyperion (Clark, 1997; Classe, 1998; Dragoon, 2003) are included when they conform to the demands of being a standard system and of being integrated with an ERP system. Stand alone BAR systems not connected to an ERP system are not referred to as ES, though.

It could be argued that the development of ERP and ES in organizations has gone through at least two evolutionary cycles (Shanks et al., 2003). The first cycle included the acquisition, configuration and implementation of the ERP system, along with changes inflicted on organizations after going live with the system for the first time. The second evolutionary cycle follows when managers who have gone through the first cycle begin asking questions such as: How can we gain greater benefits from our ERP investments? How can ERP systems be managed and enhanced to continuously align the system with the strategy and structures of the organization? How will the ERP system impact the business and create new ways of working? How will ERP systems impact management practices in the short and long run? (Kræmmergaard and Koch, 2002). This means that implementation issues are no longer of primary concern, but that issues of utilization and development of the system are, as well as business value enhancement and ensuring the strategic alignment of these systems. Adding BAR systems or functionality are examples of projects spurred by this second evolutionary cycle (Rikhardsson and Kræmmergaard, 2005).

ES implementations from the first development cycle have been explored mainly through case studies focusing on, for example, strategic options, how to avoid implementation failures and how to identify issues of strategic alignment, as well as business process reengineering issues (Esteves and Pastor, 2001; Dong et al., 2002; Al-Mashari, 2003). Only recently has research appeared aimed at ERP and ES issues in the second development cycle (Rikhardsson and Kræmmergaard, 2005).

Research into the application and impacts of enterprise systems has a clear message: These systems have the ability to enable the transformation of a business as well as the generation of real business benefits. But, the emphasis is on the word "enable". Enterprise systems, which do not automatically lead to business benefits, can do so only if the company can utilize the system strategically and tactically – in other words, the ES, like any other company asset, has to be managed (Markus et al., 2003; Ross et al., 2003; Davenport et al., 2004). Thus, this research introduces and uses the term "enterprise system-enabled organization" (Elmes et al., 2005) instead of only using the term ERP or ES. This shift is important as the true impact of ERP systems does not emerge through simply "turning the system on", but in the management and utilization of the system over time.

Management control

Control means different things to different people. Some sources have even identified over 50 different meanings of the term "control" (Rathe, 1960). The accounting and organization literature uses terms such as management control, organizational control, internal controls, strategic control, operational control and financial controls, which all seem to revolve around the same concept.

Management control has been defined both from a process and a system perspective. Otley and Berry

(1980, p. 235) define control as, "the process of ensuring that the organization is adapted to its environment and is pursuing courses of action that enable it to achieve its purposes" (1980, p. 233). Flamholtz and Das define organizational control as, "attempts by the organization to increase the probability that individuals will behave in ways that will lead to the attainment of organizational objectives" (1985, p. 35). Emmanuel et al. define management control as, the "processes by which organizations govern their activities so that they continue to achieve the objectives they set for themselves" (1995, p. 11). Anthony and Govindarajan define management control as, "the process by which managers influence other members of the organization to implement the organization's strategies" (2003, p. 10). The common characteristics of the definitions mentioned above are that they focus on management control as a process by which the organization tries to achieve its objectives. Other definitions of management control are based on a system perspective. Lowe defines management control as, "a system of organizational information seeking and gathering, accountability and feedback designed to ensure that the enterprise adapts to changes in the substantive environment and that the work behavior of its employees is measured by reference to a set of operational sub-goals (which conform with overall objectives) so that the discrepancy between the two can be reconciled and corrected for" (1971, p. 5). Simons defines management control systems as, "the formal, information based routines and procedures managers use to maintain or alter patterns in organizational activities" (1995, p. 5). Describing the characteristics of a management control system, Anthony and Govindarajan (2003, p. 4) identify a number of elements that are present in control systems. The authors draw analogies to systems such as automobiles, thermostats and the human body. Management control is seen as a simple cybernetic system, much like a thermostat, where there is a single feedback loop. Recent writings on management control takes a broader view of management control, as is apparent in the definitions cited above, where it is recognized that there are not always preset quantifiable standards with which to measure performance against, but that management control still takes place through supervision, codes of conduct, guidelines, etc. (Merchant and Van der Stede, 2003). Controls are also designed to prevent deviations instead of only reacting to control problems, which is the view inherent in much of the earlier writings on management control. Anthony and Govindarajan (2003, p. 6) point toward some of the characteristics of management control that actually make it more complex than a simple cybernetic system. Fundamentally, implementing and running a management control system means ensuring that the organization does the right things in the right way, both regarding internal operations and how things fit with the external operating environment (Lowe, 1971). Earlier frameworks, like that of Flamholz et al. (1985), focused on this from the perspective of controlling work behavior and outcomes so that the organization reaches its goals. However, as mentioned above, later writings stress that management control is not about ensuring achieving goals in isolation, but also about implementing corporate strategy. As pointed out by Simons (1995), this entails controlling two dimensions of human behavior that seem incompatible at first glance. One is the creative innovation process which should ensure that the company renews itself and its offerings to the market. The other is ensuring that organizational actors fulfill the goals set out by management, as well as management fulfilling the goals set out by owners and external stakeholders. Simons calls this "organizational tensions" i.e. where managers use control systems to balance these "tensions" (2000, p. 7). Looking at what actually comprises a management control system, current research indicates that actual control activities can be classified into two main categories. Chenhall (2003) has, for example, classified the findings of numerous authors into whether management control activities are mechanistic – i.e. relying on formal rules, standardized operating procedures and routines - or organic – i.e. is flexible, responsive and has few rules and standards. Although not wrong in it self, classifying them into two broad categories seems like a bit of an over-simplification when looking at the plethora of control activities in use in organizations. The following lists some of the attributes of management control activities that could be added to the division between mechanic and organic:

1. Control level: Is the control activity performed at the level of employees, business unit (such as a sales organization), business process (e.g. a production process or a purchasing process), organization (such as a company) or a supply chain (i.e. from resource extraction to the finished product)?
2. System integrativeness: Is the control based on one person influencing the behavior of other people or is it integrated into a system (such as the enterprise system) or a process that influences the behavior?
3. Accounting relation: Is the control activity primarily a financial control based on accounting processes such as budgeting or cost control, or is it primarily related to controlling, e.g. production flows or logistic flows in, e.g. production management?
4. Decision relevance: Is the aim of the control to enhance decision making or is the aim to secure

the correct and efficient conduct of business transactions?

Finally, management control and management accounting are often seen as closely related (Emmanuel et al 1990). Management accounting practices, such as cost analysis and performance monitoring, are seen as control activities, which they certainly are. This form for accounting thus includes control activities and supplies managers with information for use in management control. One could argue however, that although management accounting is a part of the control system of a company, it is not the only element of such a system. Examining Simons' framework, described earlier, it becomes apparent that management accounting is but a part (albeit an important one) of the overall management control system. In the following literature review, we thus treat management accounting as a subset of management control, and therefore also include studies of how ERP systems have affected management accounting practices.

Summing up the above, current understanding of management control would thus seem to define management control as an organizational system consisting of specific processes aimed at ensuring the implementation of organizational strategy, at enabling the achievement of organizational goals, as well as at enabling reactions to changes in the operating environment. This is done by limiting and/or enabling the behavior of organizational members through the application of various control activities which take place in an organizational control environment. The characteristics of a management control system seem to be dependent on contextual variables, such as size, organizational structure, technology, strategy and operating environment. Control activities in the organization can be classified into several categories, such as mechanistic or organic (Chenhall, 2003). However, other categories also seem relevant. Although management accounting and management control are seen as deeply integrated, management control as an organizational process is a broader concept than just the management accounting tasks that are a part of the management control system in a company.

Management control and enterprise systems

One could ask the question as to why ERP systems, BAR systems or the integration of the two, Enterprise Systems (ES), are interesting in a management control context. On a general level, one can say that society is moving towards what can be called the post-industrial society, the networked society, the new economy, the digital economy, the information society or the knowledge society (Bhimani, 2003). These changes have often been largely due to advances in information technology and the impact it has on the way people, for example, trade, travel, communicate and entertain them. This in itself has an impact on how companies carry out production, logistics, accounting, marketing, etc., as well as on strategic planning and goal setting (Hartmann and Vaassen, 2003). Thus, exploring the impact of changes inherent in the information society on organizational behavior and on processes becomes interesting in it self as a part of the academic study of social processes and changes.

More specifically, enterprise systems are a part of the advances in information technology that drive some of the social changes mentioned above. As described previously, ES imply a radical change in how information systems are used to manage data and information and in their role in supporting decision making, business process coordination and interaction, both inside the company and with regard to external business partners. The implied integration of business processes, an increase in information transparency and the organizational changes that often take place during an ERP implementation (Rikhardsson and Kræmmergaard, 2005) also have implications for accounting and controlling processes (Hartmann and Vaassen, 2003). Thus, understanding the links between management control and ES is interesting as a part of a broader process focusing on the effects of information technology in society in general, but also more specifically regarding the effects on a specific information technology on organizational development, decision processes and management practices. Looking at the latter in the context of management control, it is notable that research into the relationship between management control and ES seems to fall into two broad categories. The first category of research is the impact of enterprise systems on accounting, including financial accounting, management accounting and auditing. Accounting has long been seen as the "nexus of control" in the registering, processing and reporting of the information in an organization needed to assess whether the company is achieving its objectives, what new opportunities should be exploited and how to judge the performance of organizational members. Thus, it would seem natural to focus on this function in assessing the overall impact of ES on management control. The second category of research addresses the impact of ES on management control at a more general level, where management control is seen as an organizational process on its own subject to changes regarding the advent of enterprise systems. Furthermore, management control is seen as something every manager in the organization does regardless of their link to the accounting department (e.g. Dechow and Mouritsen, 2005). These empirical studies will be reviewed below; starting with the accounting focused studies and ending with the more generally focused studies.

Research on enterprise systems and management control from a design perspective

Research into how ES affects accounting has looked at several distinct issues – which sometimes are bundled together in the same paper or analysis - including: (i) performance of core accounting tasks such as data registration and reporting; (ii) adoption of management accounting innovations (Bjørnenak and Olson, 1999) such as activity-based costing and the balanced scorecard in the wake of the ES implementation; and (iii) the impact of ES implementation and use on the controlling tasks of the accounting department.

In a survey of Australian firms, Booth et al. (2000) found that ERP systems improve transaction processing by making it more automated and integrated between various business functions, thus improving the "information platform" of the company. But, the survey did not find that ES automatically delivered better reporting or decision support. These higher order effects require, according to the respondents interviewed, additional investment and effort. However, the companies were satisfied with the facilities provided in the systems that had been implemented, at least regarding financial accounting, but slightly less so for management accounting. Regarding the effects on accounting practices as such, the Australian survey did not find any evidence that the companies surveyed implemented management accounting innovations in the wake of the ES implementation. One explanation is that this requires more organizational changes and system capabilities than just reporting transaction information. Also, changes can be required concerning what transaction information is registered and how it is treated in the system. The authors reach the conclusion that ES themselves are not sufficient enough to lead to the adoption of management accounting innovations even though they offer supporting facilities.

Granlund and Malmi (2002) focused on the impact of ERP, specifically on management accounting and whether it had in any way changed management accounting practices. Based on case studies done on ten international companies, the researchers also focused on whether ERP had any impact on the accounting function in these companies and whether it was the case that these changes could be explained in terms of, for example, innovation diffusion or in terms of more sociological explanations, such as power struggles or organizational isomorphism. Granlund and Malmi (2002) did not find any evidence of significant changes regarding issues such as cost accounting, performance measurement, strategic management accounting or budgeting and forecasting practices. They found, however, that routine work, as well as manual tasks regarding, for example, data registration and consolidation was minimized due to system integration and new technological options.

Hyvönen (2003) surveyed a sample of 300 small and medium Finnish companies regarding the effects of the use of IT either as an integrated "wall-to-wall" ERP application or as a collection of integrated "Best-of-Breed" applications. Instead of asking about benefits, the author asked about the level of problem reduction in the accounting function following the implementation of the ERP system. The top five categories in which companies reported fewer problems were:

1. Speed of reporting systems
2. Accuracy of reporting systems
3. General cost consciousness
4. Detail of information
5. Reliability of reporting system

Hyvönen also points out that although some of the companies in the survey adopted management accounting innovations, it was not a question of either or. Most of the companies adopting management accounting innovations continued using more conventional management accounting techniques alongside the more innovative techniques.

In a similar manner, Spathis and Constantinides (2004) surveyed the impact of ERP systems on accounting practices in 26 Greek companies. The most significant changes following the implementation of the ERP systems were increased use of an internal audit function, increased use of non-financial indicators and increased use of profitability analysis by segment and product. The authors attribute these changes to the integration of different applications and the possibility of real time information production. The top five impacts on the accounting processes are:

1. Increased flexibility of information generation,
2. Increased integration of accounting applications,
3. Improved quality of reports,
4. Improved decisions based on timely and reliable accounting information,
5. Reduced time for closing accounts.

Rom and Rohde (forthcoming) investigate the relationship between ERP vs. BAR systems and management accounting practices. On the basis of a survey of 349 companies in Denmark, they find that ERP systems are better at supporting some aspects of management accounting, while BAR systems are better at supporting other aspects of management accounting. ERP systems seem to be better at supporting data collection and giving an organizational breadth to management accounting. These findings seem to fit well with the characteristics of ERP systems which are transaction-oriented systems with a broad functional focus. With regard to BAR systems, Rom and Rohde

find them to be better than ERP systems at supporting non-financial, external and ad hoc management accounting, the allocation of costs and reporting and analysis. Characteristic of these aspects of management accounting is that they emphasize aggregations, calculations and analyses rather than transactions, which fits in well with the definition of BAR systems as analytics and reporting systems. On the basis of their findings, they conclude that different systems support different aspects of management accounting.

Research on enterprise systems and management control from a process perspective

Cowton and Dopson (2002) studied management control changes in an UK automotive distributor. These changes were caused by both organizational changes, changes in performance measurement as well as the implementation of a new accounting information system as part of a broader ERP solution. The authors analyze this from a Foucauldian perspective, applying the concepts of visibility, disciplinary power and surveillance to the data. The results showed that the changes experienced by the managers interviewed included shifts in both freedom and constraints. But the common view was that these were personally negotiated and not the result of the new structure. Managers thought that the system implementation had entailed changes in both coercive and enabling controls (constraints and freedoms), while the actual changes were not uniform across the entire organization, but dependent on management interpretation. This is also reflected in a study done by Ahrens and Chapman (2004) which – although it does not focus on ERP systems as such – shows the importance of management interpretation.

Scapens and Jazayeri (2003), who conducted a study focusing on ERP and accounting change from an institutional perspective, found it difficult to establish that ERP is the sole cause of some of the changes cited in the literature. They argue that ERP can be an enabler of change, or accompany change, but might not be sufficient as the sole cause of change. Other factors that might also be important are:

1. The number and scope of modules implemented,
2. The implementation process and current status of the system utilization,
3. The length of time since going live,
4. The organizational structure of the accounting department,
5. The perceived roles of the accounting department by the organization,
6. The changes taking place in the environment of the accounting department, alongside the implementation that might affect the accounting department.

Scapens and Jazayeri (2003) also criticize some earlier studies for only providing a static picture of the impacts of enterprise systems and emphasize the need for longitudinal studies focusing on the process of change, rather than the outcome of change. In their own study, they follow a company that decides to re-implement a newer version of SAP several years after its initial implementation. The main findings are that the ERP brought integration, standardization, "reutilization" and centralization of both data and business processes into the company, which played a key role in the changes observed in the accounting department, including:

1. The elimination of routine jobs,
2. More line managers with accounting knowledge,
3. More forward looking information,
4. A wider role for management accountants.

These results indicate that the accounting department is loosing its monopoly on access to accounting data and has to find other ways of legitimizing its existence by, for example, adding value to information through analysis, assurance services regarding information quality and by providing managers with forward looking perspectives and scenarios instead of backward looking reports. In a study of an ERP implementation in a large international company, Caglio (2003) also notes that accounting information retrieval, processing and reporting are no longer necessarily the sole domain of accountants. On-line data retrieval tools (i.e. BAR systems) and more user-friendly user interfaces enable non-accountants to get the information they need without involving the accounting department. Caglio (2003) proposes that the traditional view of the accounting department as the centre of the organizational information system is challenged (p. 124). Accounting professionals need to cast themselves in new roles within the organization, thus becoming what Caglio (2003) call "hybrids" between accountants and other professional groups. Caglio (2003) uses Giddens' structuration theory (Giddens, 1986, 1994) to argue that accountants as a professional group are restructured in the organization as a result of ES implementation, resulting in new legitimacy, new status and an extended knowledge base. Furthermore, the accounting department is no longer the "nexus of control" in the organization, as the practice of control becomes more centralized.

Dechow and Mouritsen (2005), who examine the implementation of enterprise systems in two corporations, reach the conclusion that ERP systems enable the separation of management control from the management accounting function – even if this was not the intention. Control becomes an activity

that is integrated with commercial management, rather than being functionally separated from it. Thus, control no longer seems to be the sole domain of the accounting department, but rather a collective affair where enterprise systems define the logic through which control is performed. In the company studied, it was SAP R/3 that defined the distinction between control regarding financial and non-financial data and the distinction between the accounting and logistics structure. They find that the logistics structure is more flexible than the accounting structure and that it takes a lot of effort to change the accounting structure after the system has gone live. The authors conclude that management control is not reinvented with the implementation of ERP. A panoptic visibility is not created as control becomes a collective affair with people telling the ERP what to do and the ERP telling people what to do.

In one study, Elmes et al. (2005) look at the implementation and effects of an ES in a large organization over three years. Their main research question is the apparent paradox concerning how an ES can increase control, while employee empowerment increases simultaneously. Applying grounded theory methodology and a Focauldian perspective, the authors develop two theoretical constructs regarding the effects of ES on management control. One is "panoptic empowerment" and the other is "reflective conformity". The first addresses the simultaneous increase in control and empowerment which occurs through increased information visibility. That is to say, employees have more/better information and thus can affect the way they do their jobs. At the same time, managers and employees have greater visibility through one another's ES, which increases disciplined behavior and control. When not only hierarchical managers could exercise control, but also peers and other managers, control changed as transparency increased from being hierarchical to being multi-directional. The second construct, reflective conformity, is where the "regime of truth" shifted away from valuing "heroic", single actions in the name of expediency and effectiveness to more disciplined action within the constraints of the system. This conformity is not, as expected, followed by a decrease in reflection, but by an increase, mainly related to problem solving in relation to the use of the ES and in relation to getting the system "wrapped around" the realities of operations. As Elmes et al. state, "no finite set of embedded procedures can accommodate all possible operational needs" (2005, p. 27), so there will always be a need for understanding how to undo errors, force deviations from the model in the system, undo ripple effects, etc. The better employees understand the system, the better they are able to do so.

Discussion

Based on the above review, some tentative conclusions can be drawn regarding current research on the relationship between ERP systems and management control.

First of all, most of the studies reviewed do not distinguished between the two system types we argue make up enterprise systems, i.e. the transaction registration and processing part (typically ERP systems) or the analytical, decision support and reporting part (typically BAR systems). Most of the studies seem to focus more on the effects of the transaction registration and processing part of the system regarding efficiency and effectiveness changes. However, BAR systems used in making decisions and measuring their effects would include addressing changes in the quality of decisions made. Following the arguments of Rom & Rohde (forthcoming), this focus on ERP systems is limiting as BAR systems serve other purposes and have other effects than just the ERP part. Tentative evidence, however, seems to suggest that there is a difference between the control effects of these two system types. Focusing on ERP systems, they seem to increase the efficiency and visibility of the accounting department in the organization by replacing many manual and routine tasks with automation. There is, however, no guarantee that implementation of ERP will lead to lower administrative costs, which seems to be dependent on contextual factors. Furthermore, the ERP does not automatically imply the implementation of management accounting innovations and innovative control techniques. This might change, however, as companies learn to use the system and to utilize any potential for more innovative control practices.

In general, it seems that the implementation and utilization of an enterprise system in an organization affects the control environment and the practice of management control activities as well as the characteristics of the management control system itself. Although the effects of ES utilization on management control can be expected to vary between different organizations, ES seem to separate management control from the accounting department, forcing it to redefine its role as its monopoly on control given the generation, processing and reporting of accounting information used in management control practices. This implies that control activities are, to some extent, integrated into the processes built into the ES architecture, as well as the various functions of the enterprise, thus delegating control. Furthermore, ES do not seem to create pure panoptic visibility in the organization, implying some sort of unidirectional Big Brother watchtower control. These systems seem to create different types of visibilities or types of multidirectional control depending on the actors and

structures and logics applied. It seems, though, that the type of control differs as well with managers affected by the visibility of their actions in the system, while employees are affected more directly by the system itself. That is to say, managers change their behavior to improve the performance within their area of responsibility given that others now more easily can monitor their performance. Employees working directly with the system are, on the other hand, affected by more direct types of controls such as application controls and checks.

Finally, the studies presented above could be classified into the social science framework developed by Burrell & Morgan (1979), who classify research into four different paradigms based on the fundamental assumptions adopted by the researchers. The first assumption ranges from an extreme objectivist view to an extreme subjectivist view of social phenomena. The second assumption about the nature of society ranges from whether the research stresses the status quo (or stability) in society or the aspect of change (often resulting from conflict). This results in four main domains of social science research which Burrell & Morgan call functionalism, interpretivism, critical humanism and critical structuralism. Using these assumptions and the framework developed by Burrell & Morgan (1979), we tentatively classify the studies presented above as shown in Figure 1 below.

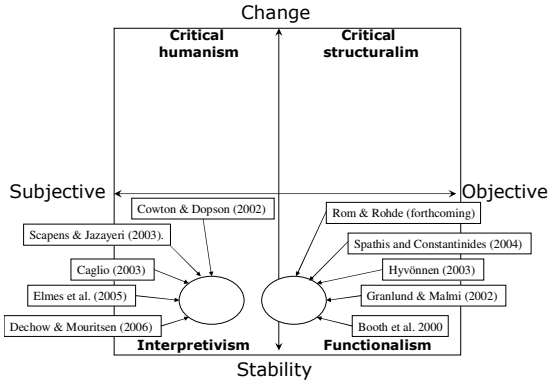

Figure 1. Classifying research on enterprise systems and management control

It is notable that a significant part of the research reviewed has been sociological in nature and has applied interpretative frameworks such as those developed by, for example, Foucault and Giddens, regarding the interpretation of empirical material. The studies that are more functionalistic in nature usually focus on what overall effects (mostly) ERP systems have caused in organizations, but not necessarily on more detailed differences between systems, modules, practices and approaches.

The methodologies applied in the interpretive studies have mostly consisted of case studies, while the methodologies applied in more functionalistic studies have consisted both of written questionnaire surveys as well as interview studies

Apparently, no studies have studied the impact of enterprise systems on management control by framing it in a comprehensive management control framework such as the one developed by Simons (1995). This would include examining the changes brought about by the ES in all four areas of say, Simons' framework of value systems, boundary systems, diagnostic control systems and interactive control systems.

Finally, the upper part of Figure 1 is notably empty. No empirical studies to date have applied a critical theoretical approach to ES, although some more conceptual work is starting to appear (Dillard et al., 2005).

Conclusion and directions for future research

Our literature review on the relationship between ES and management control seems to support the arguments of Granlund and Mouritsen (2003) and Sutton (2005), who claim that research on these issues is relatively scarce.

We would like to argue that there is a need for research based on a comprehensive management control framework that addresses different aspects of management control as well as looks at enterprise systems – i.e. both ERP systems and BAR systems. Based on Simons' framework (1995), we have identified a couple of research questions that have not yet been addressed, including:

1. Do ES have an impact on management and employee behavior by applying controls to limiting or enabling behavior and by the registration, processing and reporting of quality information to improve decisions and enable control?
2. When facing more traditional controlling tasks regarding budgeting, cost control and variance control, do managers rely more on the ERP system than on the BAR system aspect of the ES for supplying them with transaction based data and information?
3. Do managers rely more on BAR systems to generate information, build scenarios and support decisions when facing strategic uncertainties?
4. Are the values of the organization reflected in the design choices in the ES? That is to say, does the system support and enable search behavior that conforms to the values and priorities of the company?
5. Do the ES structure, set up, process models and design choices affect and support the limits for which behavior is deemed appropriate and

possible for carrying out the activities of the company?

Likewise, addressing a research issue from different angles increases our understanding of the issue. Thus, examining ES from a more critical angle, with emphasis on the conflicts and unintended consequences of these systems, should also be pursued. We would like to propose several research questions from a more critical point of view, such as:

1. Do ES empower certain groups in the organization at the expense of other groups?
2. Do ES promote a certain type of business logic, effectively creating a "false consciousness", making managers unable to contemplate other alternatives than those that can be integrated into the system?
3. In the future, will ES lead to panoptic Big Brother control systems where every transaction, action and reaction is logged and accessible for scrutiny by certain groups within the organization?
4. Are ES embedding certain structures in organizations (i.e. business process models, types of relationships, ways of doing business, etc.) that lead to some sort of "business practice monoculture"?

Regarding methodological approaches, we have, to date, seen approaches based on field studies (based on e.g. Yin, 1989; Kasanen et al., 1993; Lukka, 2003), and surveys. It is certainly relevant in these first phases of ES research to use qualitative methods to explore and to gain a deeper understanding of the issues involved and of the relationship between management control and ES. In later phases, however, it would be beneficial to support and extend these types of research with studies applying other types of methods, such as large-scale questionnaire surveys and experiments. Large-scale surveys would provide a general understanding of the impacts of ES in a variety of organizations and settings. Experiments could show the effects of ES in, for example, different decision-making situations, making this methodology a good way of studying the effects of BAR systems.

Using different theoretical paradigms and a variety of research methods would strengthen our understanding of ES and management control, both now and with regard to potential future developments.

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