The enterprise system as a part of an organization's administrative paradox

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Abstract

Purpose – The main purpose of this paper is to discuss whether an enterprise system (ES) is a part of an organization's administrative paradox. The paper aims to question which role the ES has in organizing, focusing aspects of flexibility and stability.

Design/methodology/approach – The paper is a qualitative, longitudinal, case study of how an ES maintains, and even reinforces, existing administrative organizational structures. The theoretical lens used is mainly structuration theory.

Findings – An ES can take the part of an organization's administrative paradox. An administrative paradox is two sides of the same coin when coordinating organizations – the concurrent striving for flexibility and stability. The studied ES even centralizes control, creates norms, and enhances power for actors in positions of authority (top management). Because of its structure and configuration the ES is a powerful tool to coordinate. The ES is considered to be organizationally ungainly, but at the same time indispensable.

Practical implications – The paper provides valuable insights on how the studied organizations try to deal with standardization/stability and flexibility that can be valuable for other system users or implementers to learn from, as well as the analysis as a whole.

Originality/value – The paper combines structuration theory and theories covering the administrative paradox and aspects of coordination in order to analyze and discuss the implementation and use of an ES.

Keywords Manufacturing resource planning, Information systems, Organizational development

Paper type Research paper

Introduction

Enterprise resource planning systems (ERP systems) or enterprise systems (ES) have become a major force in an organizations' use of information systems[1] in recent years (Beard and Sumner, 2004; Davenport, 2000; Holland and Light, 1999; Häkkinen and Hilmola, 2008; Lee and Lee, 2000; Newell *et al.*, 2003; van Fenema *et al.*, 2007). Enterprise systems are often marketed as the solution for organizing a firm, and promise huge benefits expressed in terms of a high degree of integration, information commonality, and dramatic gains in an organization's and even business relations/networks efficiency and bottom line. Enterprise systems can also be seen

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as an answer to several problems with "ordinary", often in-house developed, information systems, such as low level of integration, disparate data formats and separated databases. But, even if adapted to a certain organization, the enterprise system is a commercial commodity (standardized) product made by suppliers, for several companies, often in a certain line of business. A tension between the commodity product and the organizational processes often exists (Kremers and van Dissel, 2000; Wagner, 2003; Wagner *et al.*, 2006; Walsham, 2001) and can for example be expressed in terms of Enterprise systems being in serious conflicts with business strategies, causing delays and cost overruns (Kansal, 2006; Chen, 2009). This tension leaves an organization mainly with two choices:

(1) change the business processes to fit the system with minimal customization; or

(2) modify the system to fit the processes (Buonanno *et al.*, 2005).

This article will take the identified tension as a point of departure. Especially with enterprise systems or other packaged information systems, it is obvious that actions that constitute the information system are consequently separated from the actions that are constituted by the system (Orlikowski, 1992). Enterprise systems contains standardized processes and a business logic offered as "best practice" (Davenport, 2000; Kremers and van Dissel, 2000, Wagner *et al.*, 2006 – often surrounded by "promises" of positive impacts, such as structural, communicational, economical, etc. But what kind of impacts is positive for a unique organization? Flexibility? Transaction based stability? (see Beard and Sumner, 2004).

Stability and flexibility can be seen as two sides of the same coin when administering (coordinating) an organization, an enterprise system, and their dialectic relationship. This relationship is a classical one when discussing organizations and organizing. Thompson (1967) discusses the stability and flexibility dilemma in terms of an organization's administrative paradox[2]. The paradox describes the contemporaneous striving for stability and flexibility when organizing (Thompson, 1967). Stability can be defined as a holding a fixed position – not likely to move or change and flexibility can be defined as to be able to change or be changed easily according to a situation. An initial thesis in this article is that that an organization's enterprise system becomes a part of this paradox. This thesis will be further investigated in the present article. Stability in organizations is important, for example regarding production processes, interaction processes (Leana and Barry, 2000; Pfeffer, 1998). Other aspects of stability are for example to be able to sustain competitive advantage, to handle social capital, to create predictability and to reduce uncertainty (Leana and Barry, 2000). Aspects of flexibility are for example to create adaptability, cost containment and competitive advantage (Leana and Barry, 2000). These aspects will be further elaborated below.

In order to capture the subjective and objective aspects of social structures, human actions, and information systems Orlikowski (1992) and Orlikowski and Robey (1991) will be used as points of departure to analyze the case of an engineering firm[3], their implementation, and use of an enterprise system. Orlikowski (1992) and Orlikowski and Robey (1991) draw heavily on Giddens's (1979, 1984) theory of structuration. Information systems are, based on this, a social product of subjective human action and have a constitutive role. An information system embodies interpretative schemes, provides coordination facilities and is deeply implicated in linking social action and

structure and interaction (Jones and Karsten, 2008; Walsham, 1993). Enterprise systems seem to be no exception, rather an interesting example of the former utterance. This makes the field even more interesting and important to develop more knowledge within.

The main purpose of this article is to analyze and discuss whether the enterprise system is a part of an organization's administrative paradox. The question raised here is: What is the role of the enterprise system in organizing, focusing aspects of flexibility and stability? A case study is performed in order to identify if an enterprise system is a part of an organization's administrative paradox, and if identified; how this is illustrated.

The article is arranged in the following way; in the next section the research approach is presented. Then some theoretical work on enterprise systems will be discussed, organizing, and especially the relation between information systems and organizing after that. After presenting the Engineering Firm and its use of an enterprise system the duality of the enterprise system will be analyzed together with the administrative paradox. Finally an analysis and discussion follow together with conclusions and a discussion of limitations and future research.

Research approach
The empirical part of this article is based on a longitudinal and interpretive, single, case study (from 1998 until 2001, with follow-up interviews in August 2005) of an Engineering Firm (the firm is further described below) and their implementation and use of an enterprise system (Movex, version 11.3, from intentia [now M3 from Lawson Software]). The interpretative and qualitative case study approach were chosen in order to get as close as possible to the enterprise system and the organization. Another argument is that context was important to understand in order to interpret the organization's achievements to handle the situation of flexibility and stability.

The longitudinal case study is based on 23 interviews within the firm, working seminars, and studies of documents (business- and IT-strategy, internal documents, annual reports etc.). The different, multiple, sources of empirical data were used in order to get a more varied and truthful view of actors' perspectives and the implementation and use of the system. This is as a kind of triangulation (Denzin and Lincoln, 1994; Eisenhardt, 1989; Klein and Myers, 1999) that can be described as data triangulation. The triangulation used in this study is an attempt to generate a rich picture of descriptions and impressions of for example how to deal with tensions connected with the implementation and use of the present enterprise system.

The interviews were performed on site, audio recorded, and the average interview lasted for one hour. Interview guides were used, with a mix of pre-defined open questions and issues (covering themes generated from the theoretical lenses used; structuration theory and relations between implementation and use of information systems and organizing (Giddens, 1979, 1984; Orlikowski, 1992; Orlikowski and Robey, 1991) and open ended questions, topics and informal communication (Patton, 1980))[4]. Ongoing, upcoming, interview themes generated by the context and by the interviewees were also included when applicable. The interviewees are mainly people with different management positions. Examples are the managing director (MD), the central information officer (CIO), the sales unit coordinator and key account managers. Managers' sense making and experiences of the enterprise system and

organizing are focused and put in the foreground in this article, even though system users where interviewed in the case study as a whole. Users' opinions are rather exemplified in this article and are put in the background.

The work performed corresponds to central concepts and ideals in interpretive and qualitative research, such as interpretation, pre-understanding and the use of multiple methods for data collection (Denzin and Lincoln, 1994; Stake, 1994; Walsham, 1995). The interpretative tradition in the information system field is suitable in the present paper because the kind of research purpose and questions raised here and will show images of how the actors in the study "struggle" with the present system, both strategically and in daily work. The interpretative approach also follows the theoretical perspectives dealt with in this paper trying to capture the interwoven relation between implementing and using information systems and organizing work. In order to capture these issues a close and interpretative approach is needed. A more distant and positivistic approach would not have capture the issues investigated in the present case study, but may have covered other interesting issues instead. The multi-perspective approach, however, often used in interpretive and qualitative research is not so distinct in this case study due to access challenges.

As stated above the interviewees interpretation of the enterprise system when organizing is important when analyzing empirical data in this case study. An important point of departure in the interpretation of information systems is that reality is a social construction by a human actor (Berger and Luckmann, 1967; Walsham, 1993). Interpretivism can be seen as an epistemological position concerned with understanding reality and a position that all knowledge is a construction and therefore subjective. "In the interpretive tradition, there are no correct and incorrect theories but there are interesting and less interesting ways to view the world" (Walsham, 1993, p. 6). Theories (as stated above) have been used as guide for analyzing the interviewees' interpretation of the enterprise system in the present case study when organizing and an essential part of an iterative process of data collection and analysis (Walsham, 1995; Walsham, 2006).

Enterprise systems
Enterprise systems are enterprise-wide application packages that tightly integrate enterprise functions (Davenport, 1998; Kremers and van Dissel, 2000; Lee and Lee, 2000; Newell *et al.*, 2003; Weir *et al.*, 2007). According to Davenport (2000) enterprise systems have several characteristics, such as a modular construction (contains a selection of application modules), which are based on a client/server architecture and allow configuration. Configuration of tables according to business needs is one example of the latter aspect. Enterprise systems also make use of a common, usually relational, central database, and have variable interfaces. A variable interface can contain for example different languages and currencies used by a company. Enterprise systems are distinguished from "ordinary" information system by the fact that enterprise systems have a high degree of integration (see Sammon and Adam, 2005) and information commonality.

The term integration means to "combine or be combined to form a whole" (*Oxford Concise English Dictionary*, 1999). In the information systems area this often means that different systems can exchange data. A high degree of integration means that systems can easy exchange strings of data. This is considered as an important change

in the area compared to often historically isolated information systems in organizations. Information systems usually had disparate operating systems, data base structures and formats based on disparate technical specifications and were delivered by free-standing suppliers. Tapscott and Caston (1993) maintain that modern organizations demand integrated information system in order to communicate across functional and organizational borders. This has become even more important in the recent years (Weir *et al.*, 2007). If we consider this picture it is easy to understand why the promises of enterprise systems seem to be so attractive:

> [Enterprise systems] allow companies to replace their existing information systems, which are often incompatible with one another, with a single, integrated system. By streamlining data flows throughout an organization, these commercial software, offered by vendors like SAP, promise dramatic gains in a company's efficiency and bottom line (Davenport, 1998, p. 121).

An organization's efficiency, if we follow Davenport, is primarily based on its ability to coordinate input and actions into results. The fact that an information system supports or even obstructs coordination among people in, and between organizations and provides procedures for accomplishing inter-personal change should probably be especially interesting in the case of enterprise systems.

Enterprise systems are created in different steps: the supplier of the system, the modification of the system, and the use of the system (above).The point, partially following Orlikowski (1992), is that the enterprise system is constituted in at least two steps: by the system supplier and by the system implementer, followed by constituting actions (e.g. for humans in the using organization). This line of thinking can be related to the duality of technology (below).

Information systems and organizing
In this section the relation between information systems and organizing will be further investigated. This process takes its point of departure in classical organizational theory, that later is combined with Structuration theory. This section serves as a basis, a theoretical lens – a perspective, for analyzing the case.

The administrative paradox in organizing
The concept of organizing is an important verb in describing major actions taken by humans in firms in order to generate appropriate outcomes:

> To organize is to assemble ongoing interdependent actions into sensible sequences that generate sensible outcomes (Weick, 1979, p. 3).

When people act in organizations, they also create and recreate fundamental elements of social interaction: meaning, power, and norms (Giddens, 1979). These concepts make an important contribution to the understanding of organizing, an organization and its information systems. An organizing act can also be viewed as coordination. One important purpose of coordination is to formalize actions in order to reduce undesired variation, and to control and to anticipate actions (March and Simon, 1958; Mintzberg, 1983; Thompson, 1967).

However, to reduce variation in organizations by formalizing action, can be in conflict with the demands for flexibility that is highly ranked in the organizational agenda. It is a question of reducing undesired flexibility and to allow and encourage

desired variation. Another challenge (and possibility as well) is that what can be considered as desired and undesired variation is dependent of time and actor. Organizing is also a question of getting access to one's own or other organization's resources. Stability is consequently an important aspect of organizing and of organizations. According to Thompson (1967) one important purpose with establishing organizations is certain slowness in change. The dichotomy that continuity (stability) on one hand, and change, or flexibility, on the other hand, represents is labelled as the administrative paradox (Thompson, 1967). To put it in other words, the paradox of administration involves "shooting at a moving target of co-alignment", be flexible and at the same time try to progressively eliminate or absorb uncertainty Thompson, 1967, pp. 148 ff.). It is also important to notice that administration is not something that is done by an administrator – it is a process that involves the actions of several members of an organization. The paradox of administration can also be discussed in terms of time (Thompson, 1967; see also Giddens, 1979, Orlikowski, 1992). In the short run administration seeks to reduce uncertainty. In the long run, however, the administration should strive for flexibility through freedom from commitment i.e. slack (Thompson, 1967).

Aspects of fexibility and stability
The aspects of flexibility and stability, introduced above, will be further elaborated here based on Leana and Barry (2000):

> Organizations pursue change to enhance their competitive positions and their adaptability in volatile markets. At the same time, they seek the uncertainty reduction and inimitable resources that stability can provide (Leana and Barry, 2000, p. 758).

Leana and Barry (2000) discuss different aspects of flexibility and stability and the concepts as a simultaneous experience in organizational life. This is much in line with the administrative paradox (Thompson, 1967) discussed in the section above. However Leana and Barry (2000) do not explicitly discuss information technology as in the present article as a part of the simultaneous experience of flexibility and stability in organizational life.

Leana and Barry (2000) present several themes of flexibility (in order to generate change) and stability. Themes relevant in the present study will be summarized in Table I (concerning flexibility) and in Table II (concerning stability).

An overall conclusion based on the reasoning above can be summarized as follows:

> Both stability and change are simultaneously present in organizations, and both are a necessary part of organizations' effective, functioning over the long term (Leana and Barry, 2000, p. 758).

The relation between information systems and organizing
Information systems are closely associated with the organizing of work. Information systems are implicated in work through information storage, retrieval, and transmission capabilities, through providing a tool to accomplish tasks, and imposing a rhythm and schedule on the work processes. Information systems accomplish this by providing technical vocabularies to mediated meanings ascribed to events, objects, and relationships, and through coordinating activities over time and space (Orlikowski, 1991).

Theme	Description, in short
Adaptability	Adaptability is based on contingency theory. Burns and Stalker (1961) for example describe organizations adaptability to volatile environments and the need to have organic structures and processes in order to be able to adjust. Impatient capital markets can also be seen as an environmental factor
Cost containment	Change can be motivated by cost savings in firms. Outsourcing, downsizing etc. are examples of cost saving strategies
Control	Changing organization often have consolidated power and control, but without centralizing it. Such organizations are often less hierarchical and less controlling concerning individuals working within them
Competitive advantage	The themes above suggest how work can be organized in a way that may lead to a firm's overall competitive advantage

Source: Leana and Barry, (2000, pp. 730 ff)

Table I.
Themes in flexibility

Theme	Description
Institutionalism	Institutionalized organizational behavior based on routines, rather than, e.g. rationality. "Actors don't think to do otherwise". Ability or desire to change does not have to be the case among actors. Based on institutional theorists (e.g. Powell and DiMaggio, 1991)
Transaction costs	A firm as a solution to decrease transaction costs (Coase, 1937; Williamsson, 1975). Stability in employment is one factor related to this theme
Sustained advantage	In this theme sustained advantage is achieve by acquiring and linking resources in a way that cannot be easily imitated by other firms or substituted (Barney, 1991). People working effectively together through interactions and relations can be an example of a sustained competitive advantage (Pfeffer, 1998)
Organizational social capital	This theme can be related to the example based on Pfeffer (1998) above. organizational social capital is seen as the resources reflecting the character of social relations within a firm, facilitating successful collective action (Leana and Van Buren, 1999)
Predictability and uncertainty reduction	"Stability and change are both necessary for organizations to function effectively" (Leana and Barry, 2000, p. 756). One can argue that stability enables change, rather than impedes change. Flexibility is impossible to sustain in the face of constant uncertainty (Leana and Barry, 2000, p. 756)

Source: Leana and Barry, (2000, pp. 730 ff)

Table II.
Themes in stability

DeSanctis and Poole (1994) also elaborate the concepts of information systems and organizations, especially focusing on structures. They describe that prior to development of information systems there existed structures in organizations such as reporting hierarchies, organizational knowledge, and standard operating procedures. The technology then presents an array of social structures for possible

usage in interpersonal interaction including rules and resources. When these rules are then brought into action, they become instantiated in organizational life – there are structures in technology and in action, one shaping the other.

But, turning back to the question above: can information systems be suitable for a flexible organization? Maybe information systems fit traditional organizations, with bureaucracy as a starting-point. An information system can be viewed as a bureaucrat in an electronic version (Checkland and Holwell, 1998). Common features are for instance the possibility to program instructions, define formalized tasks and perform an efficient processing of data. In this scenario information systems could make problems with undesired bureaucracy even worse. An enterprise system, with its built-in rigidity (Newell *et al.*, 2001), can even contribute to the creation of organizational barriers.

The relation between information systems and organizing is complicated – implications of an information system are full of nuances and full of contradictions (Keen, 1981). The enterprise system as a special case of information is no exception. Several studies point out critical factors when implementing enterprise systems in order to reach success (e.g. Holland and Light, 1999). The relation between information systems and organizing is also discussed by Markus and Robey (1988) for information systems in general. They also conclude that effects of information systems are not deterministic, similar information systems can result in different effects dependent upon the interplay between the information system and human actors that use and legitimate the systems. A social meaning is also attributed to the system.

In this article Orlikowski's (1992) structurational model of technology is used in order to interpret the nature of the enterprise system and the structuring of the firm (section 5). This model, and the adherent perspective, is primarily based on Giddens's (1979, 1984) Structuration theory. Some key elements of this extensive social theory are outlined here. In short, structuration is viewed as a social process that involves the reciprocal interaction of human actors and structural characteristics of organizations. Structures are viewed as having two sides (the duality of structure), enabling and constraining, human action. At the same time structures are products of human action. When humans act in organizations, they also create and recreate the elements of social interaction: meaning, power, and norms. Human action, as in the case of creating meaning and communication, is linked to structures of signification at an institutional level by interpretive schemes (e.g. to make sense of one's own and others' actions). Power is linked to structures of domination by resources. One example of the latter is when human agents allocate material and human resources, and by that create, reinforce or change structures of domination. As a last dimension, (moral) sanction is linked to structures of legitimation by norms. E.g. humans sanction their own actions by drawing on norms or standards, and by that maintain or modify social structures of legitimation (Walsham, 1993).

Interpretive schemes are "stocks of knowledge" and form the core of mutual knowledge in the production and reproduction of interaction. Interpretive schemes also serve as a constraint. Resources mediate power – the ability to transform the social and material world. Norms are rules that legitimate or appropriate conduct. The elements of social interaction (meaning, power, and norms) are dependent on technology. Orlikowski (1992) deals with the duality of technology and its part in the structuration of organizational settings (Figure 1).

When humans interact with technology (a) there exists an interpretive flexibility according to Orlikowski (1992). This interpretive flexibility operates in two modes, the design mode and the use mode. In the design mode humans build certain interpretive schemes into technology, certain facilities (resources), and certain norms. In the use mode, humans appropriate technology in assigning inter-subjective meanings to it.

Human actors use technology, consequently it mediates human activities (b). Technology can also constrain performance by facilitating it in a particular manner. However technology does not determine social practices (see Markus and Robey's (1988) technological imperative); it only conditions them according to Orlikowski (1992). Another important statement from Orlikowski, based on Giddens (1984), is that the technology does not only constrain or enable social practice, it does both – it is not the question of "positive" or "negative".

Human action in organizations can be viewed as situated action and shaped by organizational contexts (c). When acting on technology humans are influenced by the institutional properties (Figure 1) of their setting (knowledge, resources, norms etc. to perform work). The (d) arrow in Figure 1 shows the relation between technology and institutional properties of an organization. The institutional properties (signification, domination, and legitimation) can be either reinforced or transformed by human actors' use of technology.The reinforcement of institutional properties is more frequent than transformation (Orlikowski, 1992). Technology users are often unaware of their role in reaffirming or disrupting institutional properties (Orlikowski, 1992).

The engineering firm
This section presents the case called "the Engineering Firm", their organizing process, and implementation and use of an enterprise system.

The case – the engineering firm
The Swedish engineering firm studied has its roots as a business unit within in a large group of organizations with long traditions. From being a project in this group in the 1970s, a subsidiary in the 1980s and 1990s, it has become a firm in its own right with new owners. The firm has several sales units around the world, combined with external sales representatives.The company's growth rate has been high both up front and in the shadow of its former owners in the group.

The firm (2008) is a global supplier of production equipment and has a turnover of more than $200 million, and approximately 700 employees. The proportion between turnover and employees indicate that this is no "ordinary" engineering firm. From the beginning they have used an extensive outsourcing strategy, for manufacturing, parts of design and administration, warehousing and distribution, and IT services.
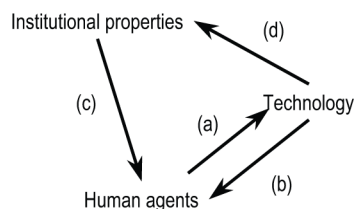

Figure 1.
Structurational model of technology

The implementation and use of an enterprise system

Movex – enterprise system in use. The enterprise system studied in the firm is Movex from Swedish intentia. Intentia is one of the top ten enterprise system suppliers with 3,400 customers and customers in more than 40 countries. Movex is used for several critical processes in the organization. Intentia describe their enterprise system with keywords such as "fully integrated", "collaborative revolution", and "ease ... upgrades". The system is organized into several application groups. Enterprise asset and performance management, e-business, supply chain management, customer relationship management and foundation and tools are examples of application groups in Movex.

The engineering firm IT strategy. The Engineering Firm has a well-developed mature IT strategy that supports information systems that are centralized, highly integrated and standardized. However, in 2005, a new CIO argues that even in 1999 and the following years the firm had a lot of functions and adjustments added to the enterprise system. The rhetoric in 1999 were probably more developed that the actual practice of using and adjusting the information system to organization specific needs. Implementation of the system in the whole organization has been carried out relatively fast and with a high degree of centralized control in order to standardize work processes and to have few adjustments in the standardized enterprise system. The use of information systems for inter-organizational communication and coordination is, however, low. Telephones and fax are the most frequently used media when communicating over organizational borders. Visions for more extensive future use of information systems in inter-organizational settings are present, but not realized when studied.

The enterprise system – organizationally ungainly and indispensable. Movex is described as an important part of the firm's IT platform and is a fully integrated system with its heart in the administration and company logistics. When implementing the information system the IT department compared it with several other systems, e.g. SAP's R/3. They chose Movex because they thought that this system should be easier and cheaper to implement than for example R/3 – they were also used to an older version of Movex and had invested in competence in that kind of system. Movex is seen by the engineering firm's CIO as "organizationally ungainly, but at the same time indispensable":

A heavy global system (Movex) creates certain inertia, but it offers a global infrastructure where everybody can work and where we can keep up the essential logistics process. (CIO, the Engineering Firm, October, 1999; all citations translated from Swedish)

The responsibility for the functionality in Movex is, according to the IT strategy, in the hands of the operative business, based on business needs and requirements. In order to be able to do that a combination of a business and IT platform are needed according to the CIO. The business platform consists of business concepts and strategies. The IT platform consists of the necessary hardware and software.

To keep up and develop the logistic process a "centrally managed and well-oiled information system" is needed according to the CIO. This is one reason why the Engineering Firm chose an enterprise system of this kind. At the same time wanting or not wanting a system like Movex is mentioned in several of the interviews carried out. The support a system like Movex can provide the firm is also full of paradoxes.

Movex is described as a basic requirement to integrate and to make communication and coordination possible between head office and sales units all over the world. Sales units are offered a direct access to product data and have a possibility to order products immediately through the system. This support is interpreted to only being realized by using the centralized and heavy global enterprise system.

The implementation process
The implementation of an enterprise system was considered to be a laborious process – especially since it was done globally. This is not unique to Movex according to the CIO. One of the reasons for the process to be regarded as laborious is that:

> The cultural clashes are bigger than you expect. The implementation is more about communication between people than information technology issues. It is also important to disseminate an understanding of the enterprise system in the organization, otherwise it can be hard to get a genuine commitment or one could end up with protests when the system is consciously used in an inadequate way (CIO, the Engineering Firm, October, 1999).

It is perceived as a large challenge to get support from people in the organization for the implementation of an enterprise system. As cited above the implementation is not "only" a new technical solution in the organization that automatically is accepted and used as intended.

> It has been much resistance from people in the organization, but it finally went [. . .] From decision to implementation of the system in the organization we only have eight months (Sales Unit Coordinator, the Engineering Firm, October, 1999).

The managing director also makes a comment concerning the implementation of Movex:

> When we implemented Movex, it felt like [the Engineering Firm] stands still for two months – or more correctly were without information generated as an outcome from the system (CIO, the Engineering Firm, September, 1999).

The firm has implemented the Movex enterprise system together with standardized measuring and evaluation systems for accounting and quality. This work is done with both determination and some degree of anxiety. One aspect that results in anxiety is whether common, standardized information restrain human actors' creativity – a creativity and flexibility that is interpreted as the foundation of the firm's success over the years.

Using Movex – flexibility and stability. The firm has certain approaches to handle the balancing between the more creative and reflective, flexible, work and the more routine, standardized, oriented work. One example is that certain organizational units (e.g. product development departments or newly acquired companies) are given a larger freedom of action than the more routine oriented, established, work units such as sales units. The freedom of action concerns the flexibility in organizing their processes for example. To use the enterprise system in units that should explicitly be creative, flexible and dynamic can be counterproductive according to the firm's CIO.

The implementation of the enterprise system is dependent on its architecture. It is emphasized by managers' that "all data is stored in one bucket". Examples of this are that there exists a common data register for all customers and suppliers, and a common accounting plan. Interviewees at the firm often put this database strategy in contrast to

smaller, distributed, locally based and diversified applications. Their opinions, at least at the headquarters as seen below, are evident; information systems should be centralized and standardized. Otherwise the cost will be too high and the solution will be ineffective. The top management at the firm has supported this strategy. Challenges in the organization to this centralized and highly standardized information systems is however present. A standardized enterprise system brings with it standard operating procedures and can be viewed as restricting freedom of action, e.g. for people at sales units:

> Just imagine the financial manager in the United States who is not allowed to choose his accounting plan, and not even his own accounts. He must apply for accounts at the headquarters in Sweden (Sales Unit Coordinator, the Engineering Firm, October, 1999).

The contemporaneous intention to standardize certain processes in order to avoid undesired flexibility, together with the maintenance of organization flexibility and freedom of action (e.g. adapting processes to customer needs), shows the complexity of enterprise system implementation.

Analysis and discussion

In the two following sections the case will be analyzed and discussed based on theories covering the duality of technology and the administrative paradox, presented above.

The duality of the enterprise system in use

The implementation and use of the enterprise system exemplified in the case can be interpreted as a way for information systems to maintain, and even reinforce, existing administrative organizational structures. The enterprise system, Movex, in the Engineering Firm, according to certain stakeholders, even centralizes control, creates norms, and enhances power for actors in positions of authority (top management) (see Orlikowski, 1992; Schwarz, 2002). The enterprise system is a powerful tool to centralize control and to enhance power of the top management located at the headquarters even more. The typical features of an enterprise system that includes a central database providing data exchange, a enterprise-wide scope and a high degree of integration (Kremers and van Dissel, 2000; Lee and Lee, 2000; Newell *et al.*, 2003) makes this kind of information system more powerful in doing this than a less integrated, more isolated, information system, e.g. related to a particular part of a process or a function in an organization. The enterprise system as a tool to support effective coordination of activities is also identified in a case study by Newell *et al.* (2003). One distinct example of the centralized control, coordination and power identified in the case study of the Engineering Firm appears when significant actors, at the headquarters, by using the enterprise system, highly standardize and constrain the US financial manager's choice of accounts, accounting processes and plans. Discussing this scenario explicitly using the structurational model (Figure 1) results in the following reasoning: the enterprise system (the technology providing interpretive schemes, facilities, and norms) reinforces and partially transforms institutional properties in the organization. The institutional properties then influence human actors using the Movex at the sales units. Institutional properties observed in the case study are for example that a specified set of accounts and accounting rules, intentions, norms and resources provided by the headquarters in Sweden, mediated by Movex, had institutional consequences for the sales units' interaction with the technology.

To put it in other words the enterprise system is itself a product of human action that is performed by the system supplier intentia, implementation consultants at the Engineering Firm, and stakeholders at the firm (dominant actors such as the top management team), enabling and constraining human action, imposing a rhythm and schedule of the work processes (see Orlikowski, 1992; Walsham, 1993, 2001) creating elements of social interaction for example at the sales units around the world. This is the notion of the duality of technology (Orlikowski, 1992) as it appears also in the Engineering Firm's use of Movex.

The social structures provided by an enterprise system can also be discussed using DeSanctis and Poole's (1994) terms for information systems and group decision support systems: structural features and the spirit of these features. Features and spirits together form an information system's structural potential. Structural features of the given enterprise system are the set of rules, resources and capabilities offered by a system. Spirits of the features of the enterprise system identified in the Engineering Firm case study are concerned with the general intent, values and goals underlying a given set of structural features, e.g. how to act when using the enterprise system and how to interpret features. The spirit of features can be compared with Giddens's legitimation, the normative frame provided by the information system. Typical questions that can be asked and answered are: What kinds of goals are being promoted by enterprise systems? What values are being supported?

When applying this reasoning on the enterprise system in the case study certain structural features (see Walsham, 1993, 2001) are identified, e.g. standard operating procedures when choosing accounting plans, choosing accounts and performing accounting. The capabilities provided by Movex are for instance sets of functions/features that regulate possible human actions related to accounting tasks at different organizational levels, for example sales units and the headquarters. Values and goals supported concern the selection of certain accounts or set of accounts, the appropriate accounting strategy, and division of labour (a centralized process design) in order to achieve an effective, but not necessarily flexible, organizational process.

The administrative paradox and the enterprise system in use

Several empirical findings from the Engineering Firm shows that the enterprise system is a part of an administrative paradox (Thompson, 1967), the concurrent search for flexibility and stability (security, reliability) in organizational action as referred to in the introduction of this paper. Several themes from flexibility and stability, based on Leana and Barry (2000), are also identified supporting the findings.

The CIO states that Movex as an enterprise system is organizationally ungainly, but at the same time indispensable when trying to create sustainable competitive advantage (Leana and Barry, 2000). This is interpreted as the enterprise system increases the firm's efficiency and capability to perform routine and back office tasks. The system helps to eliminate and absorb/reduce uncertainty (Thompson, 1967; Leana and Barry, 2000), to reduce undesired variation and to control and anticipate actions (Leana and Barry, 2000; March and Simon, 1958; Mintzberg, 1983). This creates predictability Leana and Barry, 2000) for routines and back office tasks. The enterprise system in the hands of the firm headquarters top management is a good example of a bureaucrat in an electronic version (see

Checkland and Holwell, 1998) with its actions on behalf of the headquarters conviction of defining standardized operating procedures for, e.g. accounting at sales units and efficient processing of accounting data.

The Movex system at the same time reduces the firm's flexibility that is the capability of "shooting at a moving target" (Thompson, 1967) and increases inertia in the Engineering Firm CIO's terms. Flexibility, in line with basic ideas in contingency theory (Burns and Stalker, 1961), for example in terms of adapting different sales units processes to regional or local customer needs. The adaptation, however, is commented by a system user in the following way:

> We have not measured it [effects of the adaptation of the system]. We have stated that it not worked the way it was set up (System user, the Engineering Firm, August, 2005).

The responsibility of the functionality in Movex is another aspect of the administrative paradox. On one hand the responsibility for the functionality is said to be in the hands of the operative business, based on "local" business needs and regional requirements, but on the other hand the overall responsibility for the enterprise system, standardized processes and the platform is in the hands of the top management and the IT department. It is possible to interpret this aspect of the administrative paradox in at least two ways. There is a gap between rhetoric and practice concerning the responsibility for the functionality in Movex. Rhetoric is here represented by statements in the IT strategy and by the CIO. Practice is here represented by the operative business ways of really adapting the enterprise system and the intertwined work processes to business needs and requirements.

The other way to interpret this aspect of the administrative paradox is that it is a question of time (see Giddens, 1984; Thompson, 1967; Orlikowski, 1992). In the short run the firm seeks to reduce uncertainty, be stable and to be efficient. One way of doing this is to use the enterprise system as a tool for management to standardize work processes when organizing, as in the case of for example the sales units. In the long run the combination of the business and IT platform can be used as an infrastructure that is more flexible and allows for more freedom of action.

If one analyzes the top management interpretations of the implementation of the enterprise system an ambiguous picture appears, even if the overall picture is that the implementation of Movex went well. The ambiguity concerns the cultural clashes, implementation time, commitment and information output during the time for implementation. The overall picture of the implementation process should however be regarded as based on a fairly homogeneous stakeholder group – Engineering firm managers. A more heterogeneous group would most likely have strengthened the picture with nuances and contradictions of the enterprise system, the role of the technology and the implementation process critical factors (see Askenäs and Westelius, 2000; Holland and Light, 1999; Keen, 1981; Markus and Robey, 1988).

A simultaneous achievement of the two apparent extremes in the administrative paradox, stability or efficiency, and flexibility, is also identified by Newell *et al.* (2003) in a case study of an implementation of an enterprise system in parallel with a knowledge management system. One research finding from Newell *et al.*'s (2003) case study is that efficiency and flexibility were achieved simultaneously by different parts of the studied organization. This finding is also apparent in this article in the case of

sales units as an example of a routine oriented, efficient, work unit and the product development departments and newly acquired companies as an example of more flexible units with a larger freedom of action.

Enterprise systems possess the potential to perform coordination of actions that are important when organizing firms. An example of this is to assemble interdependent actions into sensible patterns that generate sensible outcomes (see Weick, 1979). The use of an enterprise system in coordination implies that certain coordination is allocated from a particular coordination situation to a systemic situation. This allocation can result in a higher share of pre-defined, stable and formal coordination at the sacrifice of an inter-personal, and sometimes more flexible, coordination. The allocation can be viewed both positively and negatively from a flexibility and stability perspective. A high share of standardization (pre-defined, stable and formal) however, does not need to be negative for users of an enterprise system in the sense that the system restricts possible actions. The users cannot change the information system every time they use it, which would be the ultimate form of flexibility. A necessary level of standardization and institutionalization needs to be present (Orlikowski, 1992). Askenäs and Westelius (2000) also state that it is not possible for all users (stakeholders) to change the information system according to their own personal wishes. An enterprise system will consequently never be able to adapt totally to every individual's wishes or collective wishes on an organizational level.

Conclusions

The implementation and use of the enterprise system in the case study shows that information systems can maintain, and even reinforce, existing administrative organizational structures. In line with this the case study also shows that the enterprise system is an interwoven part of the organization's administrative paradox. These conclusions will be presented below.

Maintaining and reinforcing organizational structures

The implementation and use of the enterprise system in the case study shows that Movex maintain, and even reinforce, existing administrative organizational structures. This is in line with for example research presented by for example Orlikowski (1992) and Schwarz (2002). The studied enterprise system, as illustrated in the case study, even centralizes control, creates norms, and enhances power for actors in positions of authority (top management) when coordinating activities. Due to its structure and configuration the enterprise system, Movex in this case study, is a powerful and exceptionally suitable tool to coordinate, centralize control and to enhance power of the top management located at the headquarters even more. This is also identified in a case study by Newell *et al.* (2003). Using the enterprise system makes it possible for the dominant actors in the studied firm to enable and constrain human action, and to impose a rhythm and schedule of the work processes creating elements of social interaction for example at the sales units around the world (see Orlikowski, 1992; Walsham, 1993; 2001). The social structures provided by the studied enterprise system, becomes the structural potential, Using DeSanctis and Poole's (1994) terms, in use. This is also the notion of the duality of technology (Orlikowski, 1992) as it appears in the case study, focusing an enterprise system.

An interwoven part of the organization's administrative paradox

In the case study the enterprise system is identified as an interwoven part of the organization's administrative paradox (see Thompson, 1967; Leana and Barry, 2000), the concurrent search for flexibility and efficiency or stability. The enterprise system thereby becomes integrated with the "shooting at a moving target of co-alignment", be flexible and at the same time try to progressively eliminate or absorb uncertainty (Thompson, 1967, pp. 148 ff.). This is shown in the case study for example when Movex is considered to be organizationally ungainly, but at the same time indispensable. This is also considered as an example that the enterprise system is a commercial commodity product that inherent a tension between the particular commodity product and the organizational processes (Kremers and van Dissel, 2000; Wagner, 2003; Wagner *et al.*, 2006; Walsham, 2001). The overall approach applied by the firm in the case study is to change the business processes to fit the system with minimal customization; not to modify the system to fit the processes (Buonanno *et al.*, 2005)

Time is also considered to be an important factor when interpreting the administrative paradox. In the case the business and IT strategy, with the standardization of work process can be interpreted as a way of being efficient and stable in the short run. The IT platform in itself with the application package, and the way the firm handles system functionality, can be interpreted as an infrastructure that should be flexible and should support a freedom of action in the long run. In the short run administration, by using Movex, seeks to reduce uncertainty. In the long run, however, the administration strives for flexibility through freedom from commitment i.e. slack (Thompson, 1967) as described above.

Another example of the concurrent search for flexibility and stability, in line with Thompson's (1967) administrative paradox, is identified in the way the firm in the case study handles information system support for routine oriented organizational units versus development oriented and newly acquired companies. Two different approaches are used – a more standardized, pre-defined and formal approach in the first case, and a more flexible and free approach in the latter case.

Conclusions summarized

The conclusions can be summarized as the enterprise system in the case study:

(1) Maintains and even reinforces existing administrative organizational structures, affecting flexibility and stability (below):

- even centralizes control, creates norms, and enhances power for actors in positions of authority (top management) when coordinating activities due to its structure and configuration; and

- makes it possible for the dominant actors in the studied firm to enable and constrain human action, and to impose a rhythm and schedule of the work processes creating elements of social interaction (e.g. at the firms' sales units around the world).

(2) Is an interwoven part of the organization's administrative paradox, the concurrent search for flexibility and efficiency or stability; integrated with the shooting at a moving target of co-alignment being flexible and at the same time try to progressively eliminate or absorb uncertainty.

This paper originally combines structuration theory and theories covering the administrative paradox and coordination in order to analyze and discuss the implementation and use of Movex, an integrated enterprise system, in a longitudinal case study of a firm with an extensive outsourcing strategy. This combination of theories and perspectives has not been identified earlier and provides a possibility to work as an emergent lens in order to interpret and understand an information system, and in this case, an enterprise system, implementation and use in an organizational and expanded organizational (network) context. The case, in itself, also provides valuable insight on how the studied organizations tries to deal and struggle with standardization, stability and flexibility that can be valuable for other system implementers or users to learn from, as well as the analysis as a whole.

Limitations and future research
This article partially has an exploratory approach, to use the structurational model and perspective in order to analyze an enterprise system together with an interest of organizing processes and to find out if there is a connection between theories on the paradox of administration and the implementation and use of an enterprise system. A more thorough analysis, e.g. from more complementary perspectives (system users on an operative level, sales units etc.), can be made using more empirical data from the case study that is shortly presented above. Management perceptions, mainly focused in this article, are not sufficient if one wish to have a more comprehensive, multi-perspective, picture of an enterprise system implementation and use.

One can of course also ask oneself: what is so special with enterprise systems compared to other information systems? Characteristics of an enterprise system can differ from other kinds of information systems – but what can be learned more explicitly from the field of information systems when analyzing enterprise systems? the lack of such discussion is a limitation in this article. It could also be interesting to study other enterprise systems, and to involve system suppliers in future work – and a combination of supplier-customer relationships. Orlikowski's (1992, p. 421) thesis: "the greater the temporal and spatial distance between the construction of a technology and its application, the greater the likelihood that technology will be interpreted and used with little flexibility" can also be further elaborated when studying enterprise systems. The temporal and spatial distance in the case of enterprise systems, especially when a highly standardized strategy of implementation is chosen, can be an issue for further research. A more critical stance towards the limitations in using structuration theory is the information systems field can also be taken (see Jones and Karsten, 2008).

Notes
1. The term "information system" will be used to describe a computer-based information system, and handle enterprise system as a special case of computer-based information system.
2. The paradox as a concept as such is for example explored by Lewis (2000).
3. The Engineering Firm is anonymous at its own request.
4. Themes in the interview guide are for example: IT strategy, implementation process, standardization v. adaptation, flexibility v. stability, integration, etc.

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