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Information systems use as strategy practice: A multi-dimensional view of strategic information system implementation and use

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ABSTRACT

Information systems (IS) are strategic in so far as they are used to realize strategic intent. Yet, while much has been said about aligning IS functionality with the strategic intent and how to organizationally implement strategically aligned systems, less is known of how to successfully implement strategic change associated with system use – a truly critical challenge within strategic IS implementation. Drawing on a strategy-as-practice perspective we address this gap by developing a multi-dimensional view of IS strategy, conceptualizing three key challenges in the IS strategy process, to explain how and why a paper mill, despite successfully implementing a strategic production management system, failed to produce intended strategic change. We call this outcome *strategy blindness*: organizational incapability to realize the strategic intent of implemented, available system capabilities. Using a longitudinal case study we investigate how cognitive rigidity of key actors and fixed, interrelated practices shaped the implementation of the new production system. We also identify core components and dynamics that constitute a richer multi-dimensional view of the IS strategy implementation (alignment) process. In particular, we identify three salient factors that contribute to strategy blindness – mistranslation of intent, flexibility of the IT artifact and cognitive entrenchment – and discuss how they affect strategic implementation processes. We conclude by discussing implications of our findings for IS strategy theory and practice, especially the contribution of strategy-as-practice to this stream of research.

1. Introduction

Claims that strategic investments in information technology (IT) are instrumental to firms' long-term survival are now regarded as truisms. The truth behind these truisms, however, is that IT investments matter only as far as IT capabilities become embedded in new organizational practice (Doherty and Terry, 2009; Galliers, 2011; Markus and Robey, 2004; Peppard and Ward, 2004; Sambamurthy et al., 2003). Information systems (IS) strategies should therefore complement high-level

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organizational investment goals and identify IT-enabled organizational changes necessary to realize them (Reich and Benbasat, 1996). While much attention is paid to the challenge of aligning a firm's strategic intent with investments in IT capabilities (Chan et al., 1997; Chan and Reich, 2007) and the challenge of organizationally implementing those IT capabilities (Markus, 2004; Orlikowski, 2000), however, little is still known of how to implement the encompassing strategic change (Silva and Hirschheim, 2007) from which strategic benefits from IT investments ultimately ensue (Cooper and Zmud, 1990; Wade and Hulland, 2004). Addressing this challenge, indeed, remains a critical concern for IS strategy practice and research (Galliers et al., 2012; Nolan, 2012; Ward, 2012). To this end, we ask how and why *successful organizational implementation* of new IT capabilities that *align with strategic intent* often leads to unexpected outcomes (cf. Markus and Robey, 2004; Robey and Boudreau, 1999) in that they *fail to produce intended strategic effects* (cf. Franz et al., 1986; Robey, 1981). We label this outcome *strategy blindness*: the organizational incapability to realize the strategic intent of implemented, available IT capabilities.

Our observation is grounded in a longitudinal case study (Yin, 1989) at a Swedish paper mill (PaperMill hereafter). Adopting a strategy-as-practice perspective (Jarzabkowski and Spee, 2009), we focus on how situated actors and interrelated organizational practices (Orlikowski, 2000; Schatzki et al., 2001) shaped the implementation of a new production management system. Building on IT adaptation (e.g., Beaudry and Pinsonneault, 2005) and change-recipient sense-making literature (e.g. Balogun and Johnson, 2005, 2004), we investigate how *cognitive entrenchment* and associated fixity of situated practices (Dane, 2010) influenced the way PaperMill came to frame and cope with the new system during implementation and subsequent use. Our findings are unorthodox: Technically, the implementation was successful as the system became embedded in organizational routines and the mill viewed the implementation as a success (cf. Markus, 2004). Strategically, however, the implementation failed, as it did not produce intended organizational change; instead of creatively using the new system to enable the new strategic intent, the system was creatively implemented to reproduce existing practices. In essence, the organization appears stubbornly and strategically blind. Our objective is to understand this dilemma and explore why some organizations become engulfed in strategy blindness rather than promoting strategic change.

The remainder of this article is organized as follows. First, we review the literature on IS strategy implementation to conceptualize three key challenges within the IS strategy process and outline a multi-dimensional view of IS strategy and change informed by strategy-as-practice research. We then review research on cognitive entrenchment to further refine our theoretical lens. Next, we describe the research setting and approach before presenting the findings from our case. Having illustrated the use of our multi-dimensional perspective, we further detail its core components and underlying mechanisms and discuss its possible applications. We then discuss three key factors that can contribute to strategy blindness, before concluding with a discussion of the implications of this research for both IS strategy practice and research.

2. Related research

2.1. IS strategy research: intents, implementations and realizations

In their recent review, Chen et al. (2010) identified three persistent strands within IS strategy research: (1) alignment of information systems with business strategy (e.g. Chan et al., 1997; Chan and Reich, 2007); (2) strategic information system planning to identify such portfolios of systems (e.g. Galliers, 2004; Ward and Peppard, 2002) and (3) the resultant use of specific systems, or their combinations, for competitive advantage (e.g. Melville et al., 2004; Piccoli and Ives, 2005; Wade and Hulland, 2004). Regardless of which strand is being examined, extant research assumes that any IS strategy is dependent upon the way it is enacted. It is therefore critical to maintain tight linkages between the firm's strategic intent, the ensuing IS strategy implementation and the *de facto* realized strategy. This suggests three key challenges to successful IS strategy implementation: (1) to achieve theoretical alignment between strategic intent and system capabilities; (2) to implement the system organizationally and (3) to shape the use of the system and related practices to achieve practical alignment with the strategic intent (Fig. 1). We review each of these challenges next.

The capability to build and maintain *strategic intent* is central to any successful IS strategy. A strategic intent "envisions a desired leadership position and establishes the criterion the organization will use to chart its progress" (Hamel and Prahalad, 2005: 64). Accordingly, organizations that exhibit a consistent strategic intent will allocate their resources effectively and engage in competitive activities that help achieve their objectives – including choices of IT systems and capabilities (Thompson et al., 2010). While any large IS project involves the set-up of system objectives and selection of IT capabilities necessary to achieve desired results (Keil et al., 2000), the first challenge highlights how selected system objectives and capabilities do not always mesh with the organization's strategic intent (Mähring et al., 2004).

Even when the selected system capabilities align with the established strategic intent, however, the system implementation itself often proves another strategic challenge (Markus and Benjamin, 2003). Although apparent misalignments between strategic intent and system capabilities are evident in several failed strategic IS implementations (e.g. Pollock and Cornford, 2004; Wagner and Newell, 2004), it is often the inability to *implement the 'strategically aligned' system* that causes an IS strategy process to fail. In a sense, the concept of a successful organizational implementation as part of a successful IS strategy has been part of the key assumptions of IS strategy literature, though not always explicitly stated. In fact, though failed, incomplete or inadequate implementations of IT systems abound in their strategic context (e.g. Leonard-Barton, 1988; Orlikowski, 1996; Majchrzak et al., 2000; Soh and Sia, 2004; Boudreau and Robey, 2005), IS strategy literature typically

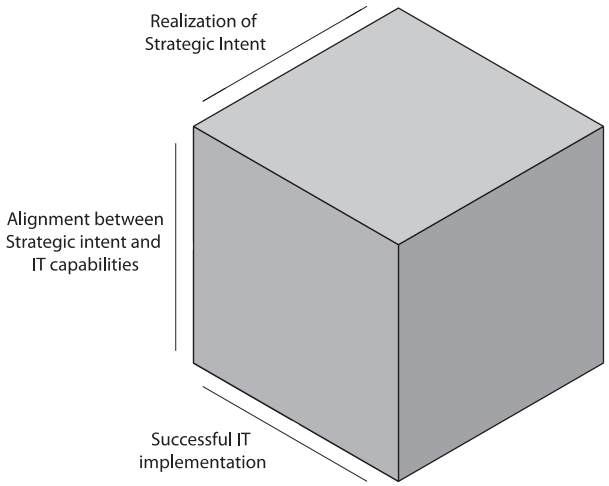

Fig. 1. Three critical dimensions within IS strategy implementation.

characterizes the implementation as a necessary and inevitable process of mutual adaptation towards eventual strategic alignment. Attempting to avoid associated pitfalls, we conceptualize the second strategic challenge as concerning the capability to implement the system both on time and with acceptable risk, and in ways that fulfill the expectations of users (cf. Markus, 2004; Silva and Hirschheim, 2007).

As a result of the unanticipated ways in which IT becomes appropriated in local practice (Barley, 1986; Orlikowski, 2000, 1992), however, not even an otherwise successful implementation of a strategically aligned system can ensure that strategic intents materialize (e.g. Robey et al., 2002). Understanding the critical and complex role that practices play in shaping how IT systems are enacted is thus key for successful IS strategy implementation (Orlikowski, 2000). Sadly, conceptualizations of strategic IT use within organizations commonly rest on the naive assumption that, for the system to be strategically successful, the IT system must just be successfully 'embedded' in relevant practices. Successful IS strategy implementation, however, increasingly implies punctuation (Nolan, 2012; Ward, 2012) i.e. systematic re-structuring and re-arranging of organizational practices (Henderson and Venkatraman, 1992; Silva and Hirschheim, 2007). In situations characterized either by deep, unexpected misalignment between conflicting organizational structures and the new IT system (inadequate or one-sided embedding), or where local practices continue unchanged, alignment between the IT system and strategic intent will never be reached and the strategic IS implementation will thus inevitably fail (Sia and Soh, 2007). Therefore, the third strategic challenge concerns the organizational capability to enact IT-enabled change: transforming and re-configuring local practices to align both system use and related organizational practices with the strategic intent.

While a major challenge for the IS strategy field will continue to be that of dealing with the complexity of how each of these three challenges play out in dynamic, networked political and economic contexts (Merali et al., 2012), we feel that the last challenge is the least understood (cf. Silva and Hirschheim, 2007; Wade and Hulland, 2004). Although IS research has largely failed to recognize this challenge in its own right (cf. Markus, 2004), alternative theoretical assumptions, such as those offered by the strategy-as-practice perspective used here, hold great promise (e.g. Jarzabkowski and Spee, 2009; Jarzabkowski et al., 2007; Johnson et al., 2007). In viewing the IS strategy process as a bundle of situated, practical accomplishments (Schatzki et al., 2001), it is indeed well equipped to elucidate the subtle interactions between challenges on the one hand and the practical setting on the other. In so doing, it can provide key insights into how and why *successful* organizational implementation of new and strategically aligned IT capabilities sometimes *fails* to transform existing practices. To this end, we next review the research on strategy-as-practice and discuss the concept of cognitive entrenchment (Dane, 2010), which we argue is a common cause for the type of strategic failure we call strategy blindness.

2.2. Strategy-as-practice, IS and entrenchment

By arguing that strategy research has lost sight of human beings (e.g. Whittington, 2003) and mistakenly reduced strategy to a few causally-related organizational and environmental variables (Jarzabkowski et al., 2007), the strategy-as-practice perspective suggests the need to understand why and what strategic actors *do* as they construct, implement and realize strategic intents (Johnson et al., 2007; Whittington, 2003); researchers have, for example, commonly investigated how these processes are shaped by actors' emotions, motivations and social and political interactions (Jarzabkowski and Spee, 2009) and the contexts in which they act (Jarzabkowski, 2005; Whittington, 2006).

Against this backdrop, the strategy-as-practice perspective directs attention to the practice of strategy – *strategizing* – and the practices actors draw upon to justify and legitimize both the future state they seek to bring and the actions they take to achieve this end (cf. Schatzki et al., 2001). In so doing, researchers often stress the performative dimension of strategy work: As "actors in their micro-situations are not acting in isolation but are drawing upon [. . .] the social institutions in which they

belong" (Jarzabkowski et al., 2007: 6), the practices within which actors are situated structure (cf. Orlikowski, 2000; Schatzki et al., 2001) strategic activities such as formulating strategic intents, choosing the system strategy and implementing the system i.e. the process through which strategic IS implementation unfolds. Conversely, while present practices affect which futures strategic actors seek, these envisioned futures simultaneously constitute particular realities, recursively shaping actions in the present (Kornberger and Clegg, 2011).

The strategy-as-practice perspective resonates with recent elements of IS strategy research which reinforce the idea that IT matters only when it becomes embedded in local practices (Doherty and Terry, 2009; Galliers, 2011; Markus and Robey, 2004; Peppard and Ward, 2004; Sambamurthy et al., 2003). As practice, IS strategy seeks to realize the potential value of IT by re-defining and re-focusing the role of IT within organizations (Chen et al., 2010; Wagner and Newell, 2004). In so doing, practices often have to be re-configured in order for value to be realized (Galliers, 2011; Melville et al., 2004); indeed, extant research holds that business value derived from IT investments primarily emerges through business changes and related innovations (Grover and Kohli, 2012; Mathiassen and Sorensen, 2008; Robey et al., 2002). As the strategic role of IT increasingly shifts from supporting organizational practices to enabling bold organizational change (Nolan, 2012; Ward, 2012), understanding how and why IT becomes locally embedded in a particular way is therefore a growing concern. It is against this backdrop that we ask how and why some organizations fail to produce organizational change despite having successfully implemented new strategic IT.

Research on IT adaptation (e.g. Beaudry and Pinsonneault, 2005; Orlikowski, 2000, 1996; Orlikowski and Gash, 1994) and change-recipient sense-making (e.g., Balogun, 2006; Balogun and Johnson, 2005, 2004; Stensaker and Falkenberg, 2007) provide a solid foundation for addressing this question. For example, Beaudry and Pinsonneault (2005) suggested that actors adapt to new IT systems as part of their cognitive and behavioral coping. Similarly, Orlikowski and Gash (1994) showed how assumptions, knowledge and expectations about an IT system shaped its subsequent use. Orlikowski (2000, 1996) also proposed a practice view of IT adaptation, perceiving use as enacted through situated practices. Furthermore, Balogun (2006) argued that strategic change often results in unexpected outcomes because top management control is tenuous at most. Similarly, Balogun and Johnson (2005, 2004) stressed the significant role middle management plays as 'change intermediaries' in the change-implementation, a position allowing them to frame both aims and outcomes. Stensaker and Falkenberg (2007) offered a similar view, providing links between frames, responses and outcomes. Accordingly, IS and strategy-as-practice research show a shared appreciation for how change-recipients influence change outcomes and the role cognitive schemata and framing (sense-making) play during this process.

In this paper, we extend the cognitive framing literature by paying particular attention to the concept of *cognitive entrenchment*. Dane (2010) defined cognitive entrenchment as a high level of stability in an actor's domain schemata. Similarly, Sanger and Singh (2012) viewed it as the inability to unfreeze schemata that impair decision-making. Entrenchment is, thus, a condition in which fixed, stable frames make practices blind to changes in their environment. As schemata develop over time, entrenchment can be associated with stability and fixity of practices; repeated activation of a particular schema tends to stabilize the structure and makes future revisions increasingly unlikely (Fiske and Taylor, 1991). While such normative alignment of thought and action (cf. March, 1994) may be unproblematic or even beneficial in stable environments (Feltovich et al., 1997), or to organizations that seek to protect culturally normative patterns of thinking (Dane, 2010), entrenchment can be costly when flexibility is needed, as is typically the case with strategic change. Indeed, as schemata influence how actors think about events (Cooper and Shallice, 2006; Henderson and Hollingworth, 1999; Marshall, 1995; Walsh, 1995), cognitive entrenchment inhibits problem solving, local adaptation and creative idea generation (Dane, 2010)[1]. Accordingly, cognitive entrenchment can produce significant barriers to organizational change (Bartunek and Moch, 1987; George and Jones, 2001; Labianca et al., 2000) and, consequently, the realization of strategic intent.

By linking stable practices to fixed relations, identities and meanings, these cognitive accounts resonate with seminal practice accounts (e.g. Orlikowski, 2000; Schatzki et al., 2001). Indeed, actors' schemata cannot easily be separated from practice as "contained in the understandings that organize a practice are those conceptual understandings, given which the meanings of the entities arranged in the practice are instituted" (Schatzki, 2001: 55). From a practice perspective, cognitive entrenchment may, then, be a key to understanding how and why strategy blindness is produced; it helps understand how and why strategic IT systems are implemented and subsequently used in ways that fail to produce the intended strategic effects.

3. Research setting and approach

This study is based on a longitudinal case study of IS strategy implementation (Yin, 1989). Our orientation was interpretative (Walsham, 1995), paying attention to meaning-making and context necessary for understanding local change (Klein and Myers, 1999). This approach helped provide rich insight and support for theoretical development (Walsham, 1995). Drawing on strategy-as-practice, we focused on the situated actors and practices that shaped the implementation of a

[1] For example, in failing to recognize alternative or different solutions due to cognitive fixation (cf. Smith and Blankenship, 1991), actors may fail to adapt appropriately to new opportunities and challenges despite changes in fundamental environmental conditions (cf. Lewandowsky and Thomas, 2009) e.g. changes in strategic intent or access to new IT capabilities and information that permit or necessitate new forms of sense-making. Failing to combine and reorganize these complex schemata will limit the generation of novel ideas and consequently transformation of local practices (cf. Dane, 2010; Mumford et al., 2006).

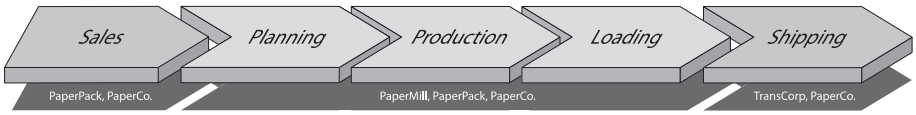

Fig. 2. The paper production process.

new production management system that was intended to bring about strategic change at PaperMill. In particular, we sought to offer a practice-based account of how cognitive entrenchment and fixity of situated practices shaped the way change-recipients came to frame and cope with the new system during its implementation and subsequent use.

3.1. Research context: paper production at PaperMill

PaperMill, a Swedish paper mill operated by PaperPack – a business group of PaperCo. – produces liner, a product used in the manufacturing of corrugated board. PaperMill produces two grades of liner, each produced in a number of combinations based on the grammage (mass/area). Annual production capacity is in excess of 400,000 tons. Production is dependent on a process spanning five work units – Sales, Planning, Production, Loading and Shipping – and three organizations (Fig. 2). Our primary focus was on the mill units as they were most directly affected by the implementation. Due to complex interdependencies, we also included Sales and Shipping to better understand the scope and intent of the strategic change the implementation should have brought about.

The production process begins at Sales. Orders are registered twice a week and determine production needs for the coming five days. Once ordered, Sales expect products to be delivered to end-customers within 2–3 weeks. Sales make two types of orders: forecast orders and direct orders, usually the former. While disruptive, flexibility for direct orders is needed: serving customers is key.

Once orders are registered and matched against pre-produced stock to generate replenishment needs, Planning creates a trim plan: an optimized, detailed plan of all products to be produced in the coming production period. For each production period, several *tambours* are produced at a standardized weight of 38 tons and moved to the *winder* (Fig. 3), where they are cut into *reels* with product-specific width and radius.

Once cut, reels are automatically transported to pre-designated ramps at the Loading bay. The bay has a storage capacity of ~100 reels, used primarily during the night when shuttles are not in operation. Once a shuttle arrives, truck drivers load the shuttle, scan the loaded reels and send a load-accomplished order. At this point, the shuttles transport the reels to the Shipping terminal, located at a nearby port, where they are eventually loaded for transport and shipped.

The production process incurs several types of losses e.g. *trim losses* resulting from the quilt-like pattern of products placed on the tambour and *length losses* resulting from fluctuations in quality as the paper grade is changed. Losses are also incurred post-production – e.g. during handling of products – and pre-production – e.g. as a result of the non-uniform quality of the tambour. To optimize production, trim planners thus need to take into consideration not only how to make best use of the tambours, but also how trim plans affect other units within the process. While a complex plan allows for greater flexibility towards customer demand, for example, it also reduces manufacturability and adds complexity for Winding and Loading. Most issues observed in our initial study stemmed from these complex interdependencies. Against this backdrop, it is imperative that the entire process is integrated not only technically, but also organizationally and socially.

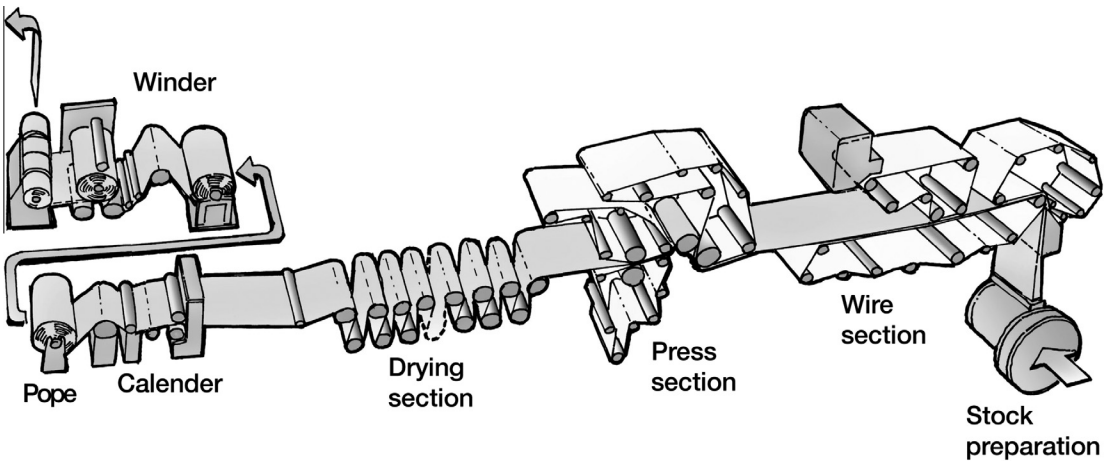

Fig. 3. The paper machine and the winder.

3.2. Data collection

Data were collected primarily through interviews, on-site observations and reviewing documents such as internal reports and project documentation (e.g. meeting notes and protocols, presentations, change-orders). In line with Klein and Myers (1999), we strove to include representatives of all groups relevant for understanding the implementation process. Eliciting data from multiple sources and in various forms allowed us to triangulate our data for authenticity (Yin, 1989). Data were gathered in two phases, first prior to implementation and second when the system was in use (Fig. 4). This allowed us to study the changes resulting from the implementation by comparing past and present practices i.e. the activities and associated sense-makings, values and norms by which these activities are legitimately organized (cf. Schatzki et al., 2001). Analysis of post-implementation adaptations also furthered our insight of how and why particular changes did or did not occur. Fig. 4 shows a timeline of key events.

In the first phase, we were invited by mill managers to study issues in the production. This worked to our favor, ensuring willingness to cooperate, availability of multiple sources and the potential for purposeful sampling (Peppard, 2001; Yin, 1989). Semi-structured interviews were conducted with representatives of the five units covered in this paper. In addition, we conducted on-site observations at both terminal and mill. These observations offered a grounded understanding of the production process whilst contextualizing our understanding of the issues the mill faced.

In the second phase, data collection focused on understanding the implementation outcome. To this end, we interviewed people with rich insight into the process; notably, all respondents bar the trim planner had decades of work experience at the mill. Observations from the first phase helped inform our sampling. First, we interviewed the project manager (twice), Head of Planning (twice), a trim planner (once) and an IT engineer (once). As they were key parts of the project team that implemented the system, this offered rich and direct access into the implementation process and allowed us to elicit data about the changes that had resulted. Second, to improve our understanding of the implications for Sales, we interviewed a sales officer (once). As a former planner, this offered key insights into both sides of the Sales/PaperMill divide. Third, four formal interviews and several informal talks were carried out with a former CIO/CFO. This offered key insights into both strategic issues and practices at the mill and helped check the validity of early results, furthering the credibility and authenticity of our findings (Miles and Huberman, 1994). In addition, on-site observations helped verify our understanding of the data. Where necessary, post-interview follow-ups were also conducted.

Interviews were typically conducted in offices or adjacent conference rooms. Most interviews were recorded and transcribed verbatim. Interviews at the winder and the terminal, however, were made 'on the fly' where high levels of noise prevented audio recording; instead, notes were taken. Notes were also taken during recorded interviews and on-site observations. During visits at the mill, discussions with various employees were conducted to enrich our contextual understanding. Our understanding also benefited from prior studies within the industry in general and PaperMill in particular. In conclusion, this approach enabled us to analyze practices from the perspectives of professionals and helped us engage in productive discussions with workers at the mill (Geertz, 1988; Ngwenyama and Klein, 1994).

3.3. Data analysis

In line with Klein and Myers (1999), data collection and subsequent analysis followed a hermeneutic cycle: throughout the process, we have gone back and forth between whole and parts to gradually improve our understanding of the phenomena under observation. While the first author has carried out primary collection and analysis of data, all authors have thoroughly and regularly discussed emerging interpretations. This relates to issues of resolving contradictions and maintaining suspicion of bias informing interpretative research (Klein and Myers, 1999). Analysis of data was carried out in three main cycles (Fig. 4). First, data were analyzed using a grounded approach (Corbin and Strauss, 2008) with the aim of uncovering and understanding issues at the mill. In particular, we sought to understand how issues could be alleviated and how these issues impacted the overall production process. It is against this backdrop that we were puzzled that practices, rather than changing as a result of the new system, had remained largely the same. At this point, the second cycle commenced.

Data were now re-analyzed to produce a richer understanding of the practices at the mill. This involved reading and subsequently coding transcribed interviews and field notes, looking for statements and activities that offered insight into factors that

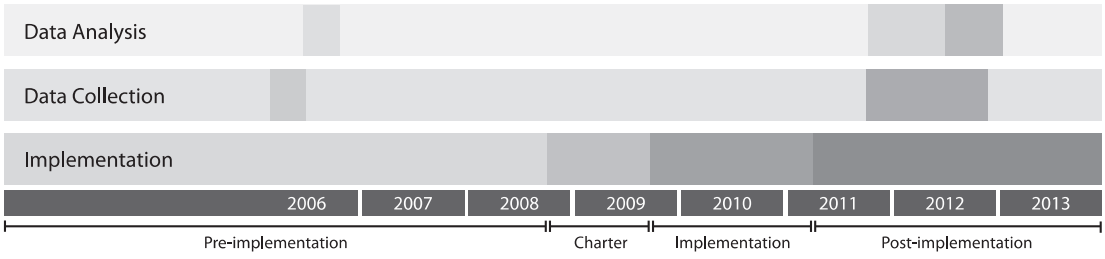

Fig. 4. Timeline detailing key events.

influence practices at the mill as well associated consequences. Again, coding was grounded, paying heed to the recommendations of Suddaby (2006). Through the coding process, emergent patterns were delineated. These patterns were then analyzed and abstracted to form five thematic categories: (inter-) *dependencies*; *ends and ideals* (i.e. differences in goals, ambitions, desired ways of organizing practices); *complicating factors* (i.e. issues that emerge as a result of these differences and environmental factors); *consequences and compromises* (i.e. how and what they practically cope with given the situation) and last, *realized and possible improvements* (i.e. what has and could be done differently post-implementation). In addition, we used the data to create a detailed description of the production process to contextualize the coded material and our understanding.

Noting that changes that reproduced and reinforced existing practices rather than altering them had occurred, while improvements that necessitated organizational re-configuration had not, the data suggested interesting phenomena obscured from view. Looking for patterns in the changes and non-changes and the ways the respondents framed and constructed ambitions and intents, several theoretical conjectures were formed. These conjectures informed subsequent data collection. Given our strategy-as-practice approach, we particularly sought to link these theoretical constructs with the situated practices that shaped the implementation and subsequent use of the new system. Ultimately, we adopted cognitive entrenchment as our primary lens. With this, the last cycle of analysis began. Again, we went back and forth between whole and part, refining our understanding through iterative collection and analysis, until coherence between whole and parts was achieved. While the first two cycles of analysis were open, this cycle used the theoretical constructs underlying our conjectures as a guide. In so doing, we paid heed to emerging generalizations and abstractions of data through the use of theories (Klein and Myers, 1999).

4. Findings

In October of 2009, PaperMill began the implementation of a new production management – or mill execution – system (MES). Some 18 months later, the system went live (Fig. 4). At the mill, the implementation is viewed as a success and the system is, indeed, embedded in organizational routines. Yet, the mill largely operates as before. This is unexpected given that the strategic intent necessitated change to routines and values – e.g. integrating work teams across the mill and making production more flexible – and that the capabilities offered by the system appear aligned with this intent. We begin this section with an account of the general role of IT within PaperMill and offer insight into the long-term standardization initiative that led to the implementation of the new MES. Next, we outline and contextualize the strategic intent underlying the implementation of MES. Then, we look both at the ways in which the system allowed for alignment with this intent and how the way MES became embedded in practice is, in fact, misaligned with both intent and the strategic potential of the system. We conclude by providing insight into why PaperMill failed to realize this potential and instead of strategic change produced strategy blindness.

4.1. IT systems and enterprise standardization at PaperPack

In the paper industry, three types of systems typically form the backbone of the enterprise architecture: enterprise systems (ERP), paper management systems (PMS) and mill execution systems (MES)[2]. ERP systems integrate internal and external management and process information and support execution of key business processes within the organization and its immediate value network. ERP systems are, in this sense, intended to enhance the flow of information between business functions and manage connections to external partners. In comparison, PMS and MES are more mill specific. Specifically, PMS support supply chain planning and follow-up as well as supply and demand balancing (e.g. forecasting of demand, stock management and replenishment requirement management). In this sense, the PMS answers the questions *what*, *when* and *where* orders are needed, keeping track of products as they are produced and shipped. In contrast, MES addresses the question of *how* products are to be produced, translating replenishment requirements into products ready to be shipped. To this end, modern MES use available information from the ERP and PMS to optimize production activities and guide, initiate, respond to and report activities as they occur. In particular, the MES supports the production process by providing functionalities such as production planning (e.g. production cycles, trimming), production execution (e.g. paper machine and winder integration, re-trimming, reporting), quality management (e.g. measurements, tests, statistics), warehousing (Remote POS, storage), shipping (Load building, transport, invoicing) and process monitoring (e.g. databases and monitoring tools). MES is thus a key strategic component for planning, execution and coordination of the mill level production.

To optimize mill efficiency, it is critical that these systems are well integrated. For example, MES relies on PMS and vice versa to maintain control over the flow of production and production-related data, data that are also critical within the ERP scope. As a result of consolidations, PaperPack's mill-level system architecture had, however, become highly fragmented. This made integration both costly and cumbersome and was often seen as a hindrance to the development of new IT functionality. In the late 1990s, PaperPack therefore decided to standardize these key systems. Due to stated Y2k issues[3] in the

[2] In some mills, these three areas are managed by two systems. For example, the scope of MES and ERP can be extended to reduce the need for a specific PMS. In fact, this opportunity had been discussed in relation to the long-term IT strategy at PaperPack to standardize these key systems.

[3] While the need to replace legacy systems and make systems Y2k-compliant was commonly used as the motivation for standardizing key assets such as ERP during this time, companies also often used this as an excuse to address more enduring needs such as business process reengineering (BPR) and work practice integration (Robey et al., 2002).

German operations, the ERP system was standardized first. Shortly thereafter the standardized PMS was put in place. With these systems operational, PaperPack began to implement a new MES across its mills. The first mill went live in 2005, four additional mills followed between 2006 and 2009. In 2009, implementation began at PaperMill. In the remainder of this paper, we restrict our focus to this particular implementation.

4.2. PaperMill in context

PaperMill is one of several mills operated by PaperPack, a business group within PaperCo, a large multinational hygiene and paper company with annual sales exceeding SEK 100bn (~$15bn) in 2011. PaperPack is divided into two units: Mills (6) and Facilities (110). The former produce liner and fluting (raw material for corrugated board), the latter refine these products into various forms of packaging. As transport costs are substantial for these low cost products, proximity to the end-customer is key. Consequently, facilities source material both internally and externally and, similarly, mills also have external customers.

Within the highly fragmented European market that PaperPack strategically operates in, there is over-capacity and fierce competition[4]. In response, PaperPack has long tried to streamline their operations, divesting operations that fail to meet financial targets while shifting resources to those that do. In parallel, PaperPack has also sought to improve customer relations by offering integrated services and increase flexibility to better meet customer demand. Enhancing production efficiency and customer relations have, indeed, come to form key elements of PaperPack's strategic intent. To this end, PaperPack views lean production as key. Asked what lean means to PaperMill, the former CFO/CIO said "Reduce waste; become more customer-oriented and engage people on the shop-floor." Elaborating on what this means for integration of practices, he stated: "You always want to serve the customer first. But [...] there should be a will to do everything as smooth as possible. That is what lean is about [...] continuous improvements." He also stressed the necessity of efficient logistics: not only are transport costs critical, second only to the cost of raw materials, the ability to deliver the right product at the right time is also key to customer satisfaction.

4.3. Strategic intent underlying MES

The new MES was implemented after a large effort to standardize core systems at PaperPack-operated mills. The system at PaperMill that the new MES came to replace (Legacy System (LS)) was implemented in the 1980s and had a long history of use. Due to incremental adaptations, LS had become increasingly fragmented. This fragmentation resulted in high support costs while increasing obsolescence led to scarce resources available for its support. Both project manager and Head of Planning stressed that the system had become a production risk.

Against this backdrop, there were many technical IT reasons for implementing the new MES e.g. improved ease of integration between key systems, reduced support costs and potential for future development. As such, PaperPack's decision to implement MES was largely welcomed by the mill. As later shown, this is also the intent that is recognized by the project team. These reasons for implementing the new system were, however, only one side of PaperPack's motivation for the investment: the opportunity to integrate and improve work practices, reduce lead-times and make production more flexible were also stated as expected strategic benefits, intents well aligned with PaperPack's strategic focus overall. Accordingly, there was a strategic intent justifying the MES implementation from a business perspective as well. We expand on this next.

4.4. MES in practice

The practices that make up the production process are highly interrelated and interdependent, forming a coherent system of practice (i.e. a practical ordering and understanding to which the individual practices relate). Within this system, differences in ideals (i.e. desired practices) and goals (i.e. results that the individual practices control and seek to achieve) provide a rich source of issues at the mill. For example, Sales has to consider shipping schedules, which in turn means that they have to rely on the production teams to plan and execute plans accordingly. Trim planners, however, also need to consider manufacturability, as low manufacturability leads to increased waste, added workload and production risks (e.g. products being damaged either at the winder or during loading). Similarly, as trim planners seek to optimize the trim, they prefer highly standardized products and few changes to production plans. Sales, however, want to offer a wide range of products and stress the need for more flexibility in adding late orders, upsetting pre-existing plans, again producing negative downstream effects by increasing complexity for workers at both Winding (e.g. necessitating more knife adjustments and generating more waste) and Loading (e.g. complicating loading and increasing the risk of damaging products). During our first visit, such issues, stemming from contradictory desires of increased flexibility and decreased complexity, were prevalent across the mill.

The new MES made it possible to address and alleviate issues as these, whilst providing the means for coping with or reducing new issues generated as a result of the intended change. According to PaperPack's evaluation, the improved functionality provided by the new MES enabled higher flexibility and shorter lead times, greater transparency of production

[4] Within the European market, the five largest actors have a combined share of 44% of raw material production capacity and 39% of the capacity for producing packaging. With 8% in both (2011), PaperPack is the second largest actor in the market.

plans, easier pre-production and improved (re)trimming capabilities, while offering improved support for customer and supply chain optimization, sharing of best practices and lean progress to improve and integrate practices at the mills. MES was indeed a modern system, far superior to the obsolete system it came to replace. Yet, in implementing the system, PaperMill largely failed to introduce change and thus prevented the realization of PaperPack's strategic intent. We elaborate on this below.

Superficially, everyone agreed that the new system was radically different and that the new qualities of the system had been helpful in attaining user acceptance:

> You want to have something new and, on the surface, or how should I put it, when you look at it there's a huge difference to go from [...] a terminal-based system that has no graphics at all – text-based – to having a Windows environment [---] you get a more user-friendly, more accessible system [...] you don't have to learn where you find things [...] you don't have to fight with the system the same way as if it was a terminal-based system. (Project manager)

The differences, however, not only related to the user interface but also included who could access key systems and to what end. For example, prior to MES, the production process was largely dependent on printouts (i.e. paper-based lists of all products to be produced within a production period, along with specifications for each product) that were hard to understand and process. Moreover, working with paper meant that any change of plans required distribution of new printouts. Consequently, shop-floor workers found it hard to keep track of the production, adding to an already complex operating environment. This also created risk when late changes were made, which contributed to the trim planners' general reluctance for change in production plans. While adequately supporting the technical process – old systems are in this respect often hard to beat – the lack of rich communication and navigational support thus constituted a major weakness. In contrast, MES offers improved support for communication and carrying out tasks e.g. by allowing (near) real-time tracking of products and processes, making the production more transparent. Thus, MES provides a baseline for extensive mill level coordination. According to the former CIO this, in turn, enables delegation of tasks down to the shop-floor. Similarly, the project manager – when pushed – argued that the added functionality enabled situational trim-adjustments directly at the winder, decreasing reliance on trim planners (who are only available during office hours while production takes place around the clock). While delegation did take place under LS, the IT engineer interviewed acknowledged that the improved capabilities offered by MES enabled the shifting of responsibility even further towards the shop-floor, making the process more adaptive and flexible. This would, however, necessitate re-organizing practice and as implementation of such changes was not viewed as part of the implementation project, there were no attempts to make them.

Furthermore, as MES offers trim planners access to all pertinent data, it reduces the need to transfer data between systems and therefore also the risk of errors and the complexity of trimming. MES also offers trim planners the ability to fine tune trims by "dragging-and-dropping" graphically-coded products across visual representations of the plan; earlier, they were reliant on making text manipulations, while juggling information across several systems, to produce a good plan. Through these simplifications, MES, in theory, enables new trimming practices (e.g. through either importing new or altering existing practical considerations while trimming). No such change was observed, however, or even deemed necessary by the trim planners. This is puzzling as the practice by which trim plans are made has significant consequences for both upstream and downstream work (Fig. 2) and thus has a key impact on the eventual realization of the strategic intent. For example, consider Loading. While the trim planner interviewed has always argued that he takes Loading into consideration, the loaders interviewed felt differently, arguing that he lacked an appreciation of their situation and his own impact on their work situation – a view corroborated by the IT engineer. In particular, the – to them – disorderly fashion in which products often arrive according to the plan creates unnecessary work (adding mileage and increasing fuel consumption), increases risk of damaging products (non-uniform pairs and single products are harder to operate than twin sets) and worsens an already poor work environment (loaders are operating diesel-trucks in an indoor warehouse). Similarly, consider Production. For winder operators, non-complex trim patterns are preferred as this reduces the need for knife adjustments. To them, fewer knife combinations make the process smoother and contribute to faster, more efficient, production. Against this backdrop, operators have a hard time understanding why there are so many changes and – like loaders – argue that Planning lacks understanding of the downstream effects that they produce. While downstream complaints like these are, to some extent, inevitable, it is interesting to note that Sales, too, raised concerns. Frustrated with what he perceived as a lack of flexibility on the part of Planning, a sales officer argued that the planners did not use the new system to its full potential. In particular, he had a hard time understanding why trim planners were still so averse to change given that the system makes re-trimming less complicated and change, hence, less disruptive. Opinions thus vary as to whether planners take responsibility for minimizing production issues in using the new system.

MES also offered improved capabilities for the loaders. Much as trimmers "drag-and-drop" products across plans, loaders can use MES to assign products to a ramp of their choice. While still being affected by the trim plan, this functionality offers the loaders more control, carving out space for doing things differently. Yet, despite this capability being embedded in most loaders' routines, no significant changes to practice have occurred. Further, despite clear financial incentives, the implementation of MES did not lead to any investigations as to how the increased control enabled by MES could improve Loading/Shipping optimization. Nor was the possibility to trim differently now that loading was less "trim plan critical" explored. Indeed, once again, our respondents indicated that no such change has even been considered while implementing MES. In fact, many respondents even questioned the relevance of doing so: to them, change was simply not part of the implementation project.

> The operators work in exactly the same way as before, like when they had the old system. There's no difference in how they work [...] What they have now is a different user interface to do the same thing as before. And sure, through that they now have a better tool – so to speak – to fix things that go wrong in their everyday practices, but the work process itself is still the same, there's no difference. (Project manager)

> Well, things are slightly easier, but it is not better, No. There is nothing new. We're not trimming differently. (Trim planner)

> [No one] has discussed the strategic importance of switching systems [---] I don't think there were ever any goals or that anyone ever had any... hope of change. (Head of Planning)

Given the strategic intent underlying the decision to implement the system and how this seems aligned with the new system's capabilities, statements like these are puzzling. Realization of the strategic intent indeed necessitated significant change to how practices interrelate and interact. The rest of our findings offer insight into how this outcome came to be. In so doing, we focus on the project team as the outcome is strongly connected to how the implementation unfolded and how the intent was translated and communicated by the team.

4.5. MES implementation as practice

The project team consisted of a project manager, members from Planning (Head of Planning and a trim planner) and representatives from IT and Production (the IT engineer technically represented Production). When deemed necessary, a representative from Loading was also present. In one sense, the project was fairly traditional, following the "PaperMill Standard": a SharePoint project site to administer the project, frequent work meetings for briefings and specification of requirements and inclusion of relevant stakeholders. In another sense, the project was unusual: PaperPack mills operate semi-autonomously and so it is rare that projects originate from the top. As the project originated in PaperPack, a central project coordinator was technically part of the project team. According to the project manager, however, his role was primarily to develop data warehouse solutions that would enable standardized data reports. The project manager saw this as a project in itself; in practice, the 'two projects' also operated in isolation.

This lack of interaction, however, can only partially explain how the project came to be framed and, thus, why the strategic intent failed to manifest itself in the implementation; at some level, the project team seems to have been aware of the new strategic intent, but rather than acknowledging it they seemed more insistent of downplaying its relevance. In fact, in handing us documentation outlining the strategic intent, the respondent stressed: "no one at PaperMill had a part in articulating these intents [...] they were created centrally". He also made it clear that implementation costs had been underestimated and that the stated returns had not materialized. These statements highlight not only that expected returns were absent, but also a clear difference in how the strategic role of the system was perceived at the *meso* (PaperMill) and *macro* level (PaperPack). Both project manager and Head of Planning also claimed that the implementation had led to no observable improvement in mill efficiency: "...to quantify gains, it is really hard. I have to agree with [the Head of Planning] there. It has not worsened and that is, in a sense, good. Slightly better, perhaps, but it is not measurable." Whilst perhaps unsurprising that returns did not materialize and that performance has remained the same given that the implementation failed to trigger organizational change, statements like these offer valuable insight into the cultural conservatism and prevalent risk-averse attitude that came to shape the project team's perception of the rationale underlying the system implementation.

Respondents at PaperMill generally acknowledged the potential of strategic benefits for PaperPack – several respondents, for example, stated that the new MES could help improve customer relations (e.g. by making production more transparent) and allow sales officers to distribute orders more efficiently (e.g. through standardizing data reports). In contrast, they were reluctant to talk about how MES could affect practices at PaperMill: only when pushed did respondents typically talk about change-related strategic benefits for the mill and, even then, they were skeptical that the new MES could ever improve performance. They often added, in fact, that it had not – downplaying the strategic benefit at the mill level. In so doing, they complemented the "discourse of necessity" – a discourse used by PaperPack as justification for their greater standardization effort – with a "discourse of replacement" i.e. they not only communicated that the implementation was something that had to be done, but also that MES merely replaced LS. For example, the trim planner said: "We want to achieve the same productivity and the same efficiency as usual. We do not want things to deteriorate and that is our goal. And we have built the project that way – that it simply should not become worse than it was before." In a similar vein, the Head of Planning argued: "I do not know if there is any real difference compared to [LS]." Talking about change, coordination and information flows, the trim planner said: "It was never part of [our discussions] that [MES] should improve information between [work practices]" and "It was merely supposed to replace an old tool and we just had to do it". Addressing the general issue of strategic change, the Head of Planning similarly said: "I do not think that has been an issue at all. Things were supposed to work as before, really." Elaborating on this, he later stated:

> I would say that it's more a matter of replacing systems [...] it's been more that... well, the old system was old, and it was time to change, and there is this decision from the top that we should have the same system at all mills. (Head of Planning)

Indeed, within the project team, themes of non-change and replacement were prevalent in talks about the new MES. This way of framing the project had clear implications for how the implementation unfolded. Rather than treating the project as strategic, the project rapidly took on a technical form with technical issues and preservation of *status quo* being dominant elements in the accounts of how and why the process had proceeded the way that it did. For example, when asked to describe key issues in the implementation, the project manager said:

> "We were set on this being an implementation project, but in reality it has become a systems development project. As a result of this, the project coordinators have come to see that the system they thought was fairly good, in fact wasn't." (Project manager)

Importantly, though, these issues were generally not seen as a hindrance to realizing any strategic change, rather they were typically perceived as nuisances; risk-elements threatening a successful implementation. In this sense, by treating the system as a replacement, the project team was able to reduce risks in implementation, as a replacement logic allowed them to *accommodate* for, rather than *shake* up existing practices. Not only did this reduce the perceived risk of change, it also helped achieve buy-in from the users as they, essentially, just ended up with a better tool to do the same thing. In the end, the general consensus post-implementation was that things had turned out okay and that the system, much thanks to these accommodation efforts, had been successfully implemented – a view that, according to the project manager, was shared by people on the floor. While aiding the IT implementation, however, this accommodation strategy inhibited change as the project team actively produced the perception of the system as a threat, rather than an opportunity.

In this sense, the decision to accommodate for existing practices indicates, on the one hand, either unwillingness or inability to perceive change as necessary, desirable or even possible and, on the other hand, a general view of change itself as a risk – something to avoid. Consequently, the project team exerted significant effort to adapt the system to the local context, making new functionality compatible with pre-existing practices, processes and machine configurations: the flexible IT artifact became forged around the *status quo*.

4.6. The fallacy of perceived determinism

Maintaining *status quo* through accommodation was also largely justified and motivated by fatalistic statements – typically with reference to the paper machine – that paper production had to be done a particular way due to the configurations of physical machinery at the mill.

> You can't govern the process, or how should I put it, adjust with the IT system. The IT system has to be adapted to the physical reality and the workflow that you have to keep as a result to get it to be effective [...] okay, it's a nice thought [...] but once you tune it so that it fits your mill you end up quite far from the standard system you started out with, so the financial return you expect, it is pretty much gone. (Project manager)

These statements provide further insight into the risk-averse rationale that shaped the implementation of MES. As change was deemed impossible, it became something to avoid – a threat to successful implementation – making accommodation an ideal strategy. These statements also serve rhetorical purposes: they help maintain the institutionalized system of meaning (i.e. the practical ordering and understanding of the organizational practice to which individual practices relate) by virtue of perceived necessity.

While reducing IT implementation risk, the view that machine configurations determine practice is, however, not necessarily correct. We indeed came across differences both within – i.e. between practices of shifts and routines of individuals – and across mills. For example, loaders lamented the change of trim planners at the mill as they felt that plans now showed a greater lack of understanding for their work. Similarly, managers raised concerns with regards to differences in production strategies implemented by different shifts. Development and dissemination of best practices across mills were also part of PaperPack's explicit intent for implementing the standardized MES. Accordingly, machine configurations make different ways of organizing the production possible. Prior to our initial study, PaperMill had also successfully switched from a two-week to a one-week production cycle, further supporting this point.

As several respondents made references to the need to maintain efficiency, it is also important to note that PaperPack's strategic intent was not to maximize the raw output from given resources at each mill, but rather to ultimately improve customer satisfaction by integrating and improving work practices in order to, for example, reduce lead times and make production more flexible and responsive to customer needs. Given this, unrealized changes suggested by our respondents – e.g. delegating tasks closer to the production floor or making better use of improved re-trimming capabilities (see Section 4.4) – appear both feasible and strategically aligned. While PaperPack's exact ambitions remain unclear – no detailed metrics were given – changes necessary to realize the strategic intent underlying the new MES thus seem better understood as unwanted, ignored or misunderstood than impossible.

Against this backdrop, machine configurations – while providing structure (e.g. boundary conditions in terms of maximum and minimum speed, width and quality of the paper and a given sequence of events) and discursively upholding existing practices (e.g. by virtue of perceived necessity) – cannot convincingly be held to *determine* a specific arrangement of practices: in short, 'machine determinism' offers an inadequate explanation of the outcome observed here as the extent to which machines determine practice in discourse simply does not meet with reality.

Further observations support this interpretation. Despite being frequently ascribed to the paper machine, obstacles to change were, in fact, often located in the fixed institutionalized practices and the ways that the deterministic discourse had been internalized therein:

> If you look at it from the [MES] perspective then you would want to work in a particular way, but it is so deeply rooted that you work in a... often like [MES wants]. But sometimes you are not working by that [...] It is impossible to change [...] There has to be a clear benefit for the operator to work in a particular way if you are to succeed [...] I can only ascertain how hard it is to make a change in work routines 'just because'. It will never work. Something has to be significantly improved for the operator if you are to succeed. (Project manager)

Statements such as these offer valuable insight into the deep-rooted, cognitive realities that reigned at PaperMill and illustrate an alternative explanation rooted in the entrenchment of practices rather than the ultimate rigidity of machines. We expand on this next.

4.7. The role of entrenchment

At PaperMill, practices have evolved over an extended period of relative stability in an extremely risk-averse environment. As is typically the case within process industries, even brief production stops have massive economic ramifications. Unsurprisingly, production practices are therefore taken for granted: in practice terms, PaperMill have produced a deep-rooted social arrangement that governs both individual practices and how practices interrelate. In this sense, people have largely come to accept that there is a fixed way of doing things, something one simply has to cope with i.e. highly institutionalized views of roles, norms, values, goals and practices manifest themselves in the fixity of their cognitive schemata. Our study indicates that this entrenchment inhibited the realization of strategic intent by making people both unable and unwilling to respond to the fundamental changes in environmental conditions associated with the implementation of MES i.e. changes in strategic intent and access to new IT capabilities and information, which both permitted and necessitated new forms of sense-making and organizing. Together with the accommodation strategy, this severely restricted exploration and (novel) use of the new MES, inhibiting the production of necessary change.

Showing a similarly restricted ability to alter their framing of the production process, the project team also rejected the system's ability to produce beneficial change throughout the implementation of MES. They failed to perceive the implementation as an opportunity and, thus, to accurately translate the strategic intent. Consequently, they were unable to adapt to the strategic change: instead of creatively using the system to enable the new strategic intent, they creatively implemented the system to reproduce existing practices. As practices were both interconnected and highly entrenched, changes were also deemed hard to implement, adding to the general reluctance within the project team to disturb the *status quo*. In this sense, entrenchment and the associated deep-rooted practices not only diminished the perception of opportunity as the project team made sense of the implementation, but also increased the perception of risk, providing additional grounds for the risk-minimizing, disturbance-handling, accommodation approach the project team came to adopt.

Against this backdrop, the processes by which IS strategies become implemented, once formulated, are rich and complex, dependent on both the situated actors who come to implement them and the practices through which strategic change is ultimately to be enacted. In the next section, we develop our multi-dimensional view of IS strategy further to unravel the complexities of this case.

5. Discussion

In this paper, we drew on strategy-as-practice to develop an empirically grounded perspective of the strategic implementation of a new mill execution system (MES) in a paper mill. Having illustrated the use of our multi-dimensional view of the IS strategy process, we now develop it further by detailing its core components and underlying dynamics supported by evidence from our case study. We then discuss three key factors that can contribute to strategy blindness as to explain our unorthodox finding, before concluding with a discussion of the implications of this research for IS strategy practice and research.

5.1. A multi-dimensional view of IS strategy

We asked how and why successful organizational implementation of new strategically aligned IT capabilities can lead to unexpected outcomes, in that they fail to produce intended change. To this end, we conducted a longitudinal case study of the implementation of a new MES in a Swedish paper mill to explain how and why this strategic IT change resulted in strategy blindness: the incapability of an organization to realize the strategic intent of implemented, available IT capabilities. Adopting a strategy-as-practice lens, this paper formulates a multi-dimensional view of IS strategy implementation to make sense of the findings.

Our first contribution to IS strategy is the multi-dimensional view of IS strategy and the associated conceptualization of three salient challenges for successful IS strategy implementation: (1) selecting system capabilities that align with and enable the strategic intent; (2) implementing the systems successfully within the organization and (3) producing the necessary organizational change to allow the strategic intent to be realized (Fig. 5). Our study clearly indicates that all these dimen-

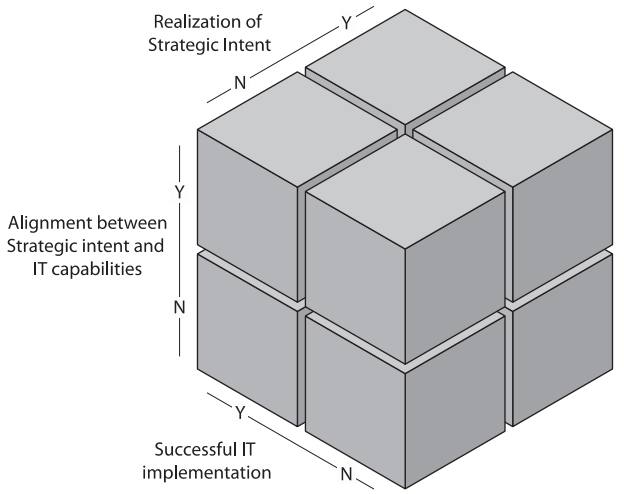

Fig. 5. A multi-dimensional view of IS strategy.

sions must be taken into consideration when exploring, as well as managing, outcomes of IS strategy. In so doing, it also illustrates the usefulness of this view. While traditional approaches have typically failed to consider the full complexity of IS strategy implementation (cf. Silva and Hirschheim, 2007; Ward, 2012), this view stresses the need to understand strategy implementation as an embedded process that actors make sense of, respond to and actively shape based on the practices to which they belong (cf. Orlikowski, 2000). With JSIS's recent 20th Anniversary Special Issue fresh in mind (e.g. Galliers et al., 2012; Merali et al., 2012; Nolan, 2012; Ward, 2012), the contribution is also timely. Indeed, by facilitating deeper understandings of the IS strategy process and the complexities therein, this theoretical view makes us better positioned to aid practitioners in their struggle to capture intended strategic benefits from their IT use, particularly as the strategic role of IT becomes increasingly complex.

Importantly, our view expands, rather than rejects, prior conceptualizations of IS strategy. At its core is the traditional notion of strategic IS implementation as being successful only when the organization achieves intended benefits (e.g. Cooper and Zmud, 1990), which ultimately depends on how the implemented systems become embedded in new organizational practice (Doherty and Terry, 2009; Galliers, 2011; Markus and Robey, 2004; Peppard and Ward, 2004; Sambamurthy et al., 2003). Due to high levels of abstraction, however, extant accounts of IS implementation often lump together, confound or even ignore the key challenges of strategic IS implementation outlined in this paper (Markus, 2004; Silva and Hirschheim, 2007). While hard to separate in practice, these dimensions are conceptually distinct and clearly associated with their own challenges (Section 2.1). By unpacking these dimensions, our view thus enables a deeper, detailed understanding of the processes by which strategic IS implementation is successfully achieved.

Our case illustrates how IT implementation ideals (e.g. risk avoiding) can run counter to necessities of change implementation (e.g. risk inducing). By making salient the constant trade-off between system implementation risk and strategic realization risk, it elucidates how and why an imbalanced focus – here the one-sided accommodation strategy – may cause strategic IS implementation to fail. As the root cause for failure can be found on either side, distinguishing between *Successful IT implementation* and *Realization of Strategic intent* is therefore necessary (cf. Cooper, 2000; Markus, 2004; Robey et al., 2002). To this end, we define *IT implementation* as successful when a system is implemented on time, at reasonable cost and with acceptable risk (cf. Markus, 2004) and is embedded in organizational routines and, thus, accepted by its users (cf. Silva and Hirschheim, 2007). In contrast, *Realization of strategic intent* is considered successful only when organizational change necessary to realize the strategic intent underlying the implementation has occurred (for a similar distinction, see Markus, 2004).

IS strategy implementation can, furthermore, fail due to inappropriate selection of system capabilities (Mähring et al., 2004; Thompson et al., 2010). Examining this in more detail, we distinguish *Alignment between Strategic intent and IT capabilities* from the processes by which *Realization of Strategic intent* is achieved. In so doing, we move beyond the traditional view of IT alignment where system alignment is assessed *ex post*, as this view obscures the distinct challenges associated with each dimension (Fig. 5) and thus inhibits identification of the root cause (for a critical discussion, see Ciborra, 1997). Had we, for example, not investigated whether the new system supported the strategic intent, we could not as convincingly attributed the strategic failure to the processes of adaptation and use and the role of entrenchment therein; the failure may, instead, have been the result of misalignment between capabilities and intent (e.g. Pollock and Cornford, 2004; Wagner and Newell, 2004). Thus, we define *Alignment between Strategic intent and IT capabilities* as successful when selected system capabilities enable the strategic intent that the organization wishes to realize.

With these key dimensions defined, we now turn to the analysis of our case study. In so doing, we highlight the need to view IS strategy as an embedded process. First, our data indicate that the new system was capable of enabling change aligned

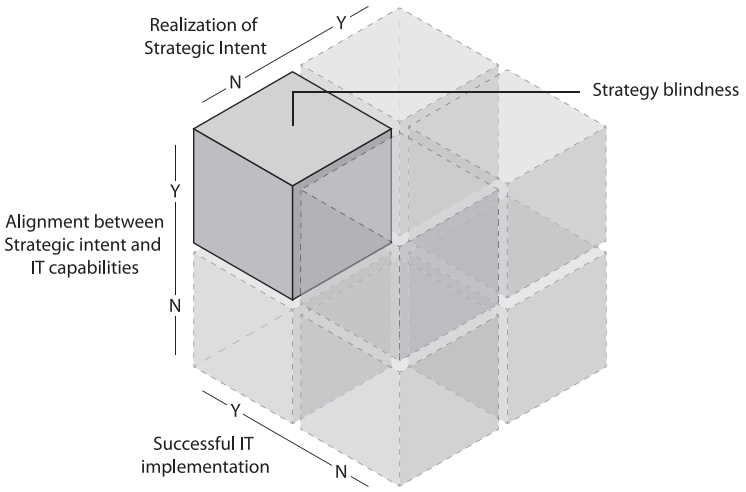

Fig. 6. Strategy blindness within the multi-dimensional view.

with the strategic intent of the firm. Accordingly, the failed outcome cannot be ascribed to a misaligned IT artifact. Second, while the implementation proved harder than first thought, our data indicate that the IT implementation was largely successful – both in terms of time, budget and risk and the way the system is now accepted by, and embedded in, the organizational routines of its users. Third, our data show no indication, however, that the system has led to changes necessary to realize the strategic intent underlying the implementation. While such realization may emerge over time (Robey et al., 2002), we therefore conclude that the strategic IS implementation, to date, is a failure; instead of strategic change, PaperMill produced strategy blindness (Fig. 6). To make sense of this unorthodox finding, it is necessary to account for the ways that actors make sense of, respond to and actively shape strategic processes based on the practices to which they belong, elucidating interactions between the IS strategy and the practice in which it is implemented. We expand on this next, while detailing the particularities of our case.

5.2. Strategy blindness within strategic IS implementation

Our second contribution to IS strategy is the understanding of constituent factors and processes that can produce strategy blindness, in particular with regards to the role of entrenchment. In the following discussion, we re-evaluate and expand past claims that an IS strategy process must take into account the way it is enacted (Chan et al., 1997; Chan and Reich, 2007; Galliers, 2004; Melville et al., 2004; Piccoli and Ives, 2005; Silva and Hirschheim, 2007; Wade and Hulland, 2004; Ward and Peppard, 2002). In particular, we highlight how IS strategy implementation processes are rich and complex, dependent on both the situated actors who implement them and the practices through which strategic change must ultimately be enacted. While assuming equifinality, in that strategy blindness – as a general IS strategy outcome (Fig. 6) – may be produced in many ways, three factors appear particularly salient to the production of strategy blindness at PaperMill: (1) failed specification, communication and translation of intent; (2) IT artifact flexibility and (3) cognitive entrenchment. We discuss each of these next.

Strategy blindness is particularly salient in the (mis)translation of strategic intent during the implementation stage of the IS strategy process. At PaperMill, failed specification and communication of the strategic intent indeed created the origins of strategy blindness because the strategic intent, as defined by PaperPack, never translated into a strategic implementation plan capable of enacting a perception of strategic change as necessary at the mill level. While these results lend support to prior literature that highlights the need for effective communication of the intent underlying change initiatives (Keil et al., 2000), our analysis indicates that there is more than mere communication failure occurring: this study shows how the presence of multiple (albeit non-conflicting and overlapping) strategies can produce a legitimizing 'ambiguity of intent', which affects how change-recipients translate signaled intents during implementation and thus how strategic IS become implemented in use. The existence of a standardizing strategy, for example, allowed the project team to justify and rationalize the view of the system as a replacement, in turn enabling their risk-minimizing, accommodation approach. By highlighting the salient role of the specification, communication and translation of intents within strategic IS implementations and affirming the important role of change-recipients as construers and constructors of change (Balogun, 2006; Balogun and Johnson, 2005, 2004; Stensaker and Falkenberg, 2007), this study has pivotal implications for IS strategy practice and research.

By structuring the implementation process, the flexibility of the IT artifact also matters for the production of strategy blindness. While prior studies have observed that IT artifact flexibility affects its emergent use (e.g. Orlikowski, 2000), the role of artifact flexibility during strategic IS implementation is little understood. As shown here, however, the flexibility

of an artifact not only affects its use, but also determines which situated translations of strategic intent that are possible. For example, the flexibility of MES made it possible to accommodate existing practices during implementation. On the one hand, it allowed the project team to treat the system as a technical replacement, enabling a disconnect between the strategic intent and its translation in practice through continuous adaptations; on the other hand, it proved incapable of imposing a new logic on practice and encourage or provoke change (cf. Brynjolfsson et al., 1997). The effects become particularly clear in contrast with the paper machine: a huge, rigid artifact with a clearly perceived logic to which production practices have bent to the point that it is viewed as determinant. Against calls to bring the IT artifact into theory development (Orlikowski and Iacono, 2001), this highlights an interesting opportunity for IS strategy research to uncover how the particular characteristics of technology can affect strategic outcomes.

Last, cognitive entrenchment provides a particularly salient source of strategy blindness. Entrenchment is viewed here as a condition in which fixed, stable frames make practices immune to changes in their environment by making situated actors ignore information that would permit or necessitate new forms of sense-making and understanding (Section 2.2). By linking the concept of entrenchment to the (re)production of strategy blindness, we extend and corroborate earlier studies on the effect of entrenchment on organizational change (see Dane, 2010). At PaperMill, entrenchment played a key role for the strategic failure, as it suffocated the organizational change necessary for the realization of PaperPack's strategic intent. Both unwilling and unable to adapt to the change, the project team, for example, creatively implemented the system so as to accommodate existing practices. Recognizing the fixity and complexity of the highly interrelated production practices, they, in fact, actively avoided change. Reflecting the institutionalized aversion of risk at PaperMill, the MES implementation came to be perceived as a threat rather than an opportunity (cf. Beaudry and Pinsonneault, 2005). In this way, entrenchment – and associated deep-rooted practices – may not only make actors blind to the opportunity afforded by new IT systems, but also increase actors' perception of risk, providing grounds for *disturbance-handling*, accommodation approaches such as those observed here (Beaudry and Pinsonneault, 2005). This finding well illustrates the need for a multi-dimensional view of IS strategy: to understand the outcomes that are produced, we must inevitably account for how practically situated actors make sense of, respond to and actively shape strategic processes, in effect elucidating interactions between the IS strategy process and the practices it seeks to affect.

As alluded to, these factors were interrelated. Jointly shaping the way change-recipients made sense of the change, they came together in the particular production of strategy blindness observed here. The flexibility of the artifact was, for example, integral to the translation of the strategic intent. Similarly, as entrenched actors are less receptive to change, cognitive entrenchment aided the mistranslation of the intent while the (IT-assisted) mistranslation recursively shielded actors' entrenched schemata. Further research could help uncover the nature of these relationships in more detail as well as explore other possible antecedents to strategy blindness: the context and culture within which practices and organizations are situated may, for example, be critical features that affect to what extent organizations are prone to strategy blindness. Similarly, while we point out that cognitive entrenchment is a likely key source of strategy blindness, there might be situations where organizations produce strategy blindness despite showing flexibility in their cognitive schemata.

5.3. Implications for research and practice

Our multi-dimensional, practice-based view of IS strategy has several implications. First, it complements and extends the literature on IS strategy by detailing the intricate complexities involved in IS strategy practice. Despite being a significant challenge to IS strategy, IS literature has not adequately accounted for the fact that strategic intent is not always realized, even when the system is strategically aligned and the IT implementation is successful (Robey et al., 2002). This paper illustrates how cognitive entrenchment and associated fixity of situated practices can deeply impact the ways in which change-recipients – such as project teams – frame, and thus cope with, the intended change and how this, in turn, may shape the implementation and subsequent IT use in ways that create strategy failures despite successful implementation of strategically aligned systems. Having illustrated the ability of our theoretical view to account for the real-world complexity of the IS strategy implementation, we indeed hope that we have inspired further investigations of strategic IS implementations as unfolding, embedded processes, inseparable from the practices they seek to change.

Second, process industries are, for good reasons, often risk-averse. A risk-averse cultural DNA might prove particularly challenging when implementing strategies that require changes in complex systems of practice – such as highly interdependent, coherent processes (cf. Schatzki et al., 2001). Indeed, albeit inconclusive, our study indicates a relationship between high degrees of conservatism and cognitive entrenchment (Dane, 2010). Thus, we posit that strategy blindness is more likely to occur in conservative organizations such as PaperMill, where the project team, by treating the system as a replacement, sought to minimize risks and protect the *status quo*. These results are consistent with previous research showing that, where risks exceed benefits, changes are likely to be resisted (e.g. Beaudry and Pinsonneault, 2005) and that culturally normative practices will be protected (Dane, 2010). As change necessarily incurs risk, this indicates a constant trade-off between system implementation risk and strategy realization, another area where this study and its associated strategy-as-practice view of IS strategy opens up fruitful areas for further research.

Last, we contribute to IS strategy practice by characterizing IS strategy multi-dimensionally and suggesting how firms need to consider all dimensions in their IS strategy practice. Although our study deals with one specific industrial IT application, our findings provide useful generalizable insights for other IS strategy initiatives. This includes our conceptualization

of strategy blindness as a serious, but under-appreciated issue, along with the associated conceptualization of three salient challenges that strategists have to overcome during IS strategy implementation. By unpacking these dimensions, this paper also offers rich foundation for further theorizing. While a practice lens may help us better understand each of these challenges in isolation, we argue that it can be particularly helpful in teasing out the complexities that arise across the different dimensions of strategic IS implementation as they engage with organizational practice. Thus, our model both highlights and opens several fruitful areas for further practice-oriented research within the IS strategy-as-practice stream. As an example, uncovering the processes by which strategy blindness is (re)produced – and the means by which it can be avoided or resolved – provides interesting opportunities for future IS strategy research. More research is thus needed to develop the insights we have provided here, both conceptually and in terms of practical implications.

6. Conclusions

This research reveals an unfolding shift in the way in which IS strategy is conceptualized. This shift can be interpreted in at least two ways. First, IS strategy, as we know it, is at odds with the emerging landscape of IS strategy-as-practice. If the field is to move forward and fully appreciate the complexities involved in IS strategy implementation, a multi-dimensional view of IS strategy is needed. While welcoming extensions, we believe that we have made some useful steps toward conceptualizing such a view. Second, the shift suggests a rich opportunity for future research. In particular, there is a need for longitudinal studies examining IS strategy-as-practice as conceptualized here. This study identifies several areas for such research and, through illustrations, shows how the view developed herein can be applied to generate novel, interesting insights. Indeed, we hope to see a stream of practice-based research emerge that investigates the challenges that we have only begun to explore.

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