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Developing an ERP technology: Handling incompleteness of the system

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Summary This study explores the development of ERP technology as an inscription. A single case study in a food manufacturing firm investigates the development of a technological script for manufacturing operations. The study shows the sense of incompleteness that accompanies ERP system development and explains how organizational members and system developers experience and attempt to compensate for that incompleteness by adding more particularity, trying to restore continuity, and compensating for the loss of multiplicity in the system. The study explains how these actions lead to the production of more inscriptions and the addition of layers of activity to the ERP system that the users of the system must then deal with.

Introduction

The digital economy has been marked by the increasing popularity of electronic devices and information system solutions in organizations. Enterprise resource planning (ERP) technologies have become particularly attractive to companies seeking to overcome spatial constraints by making organizational spaces visible to aid decision making (Davenport, 1998). The popularity of ERP systems has also caught the interest of accounting scholars, who have studied the various effects on accounting practices of such implementations, which include improving control at a distance and record-keeping (Chapman & Kihn, 2009); centralizing business processes (Newell, Huang, Galliers, & Pan, 2003); improving visibility by eliminating duplicate data (Scapens & Jazayeri, 2003); automating routine accounting tasks (Caglio, 2003); and creating new forms of accountability in the organization (Elmes, Strong, & Volkoff, 2005).

However, several studies have shown that ERP technologies tend not to work as expected. As ERP packages usually incorporate a set of modules with predefined operations, managers often face the dilemma of whether to adapt existing organizational practices to the rationality of an ERP technology or not (see e.g., Boersma & Kingma, 2005; Dillard & Yuthas, 2006; Granlund & Malmi, 2002; Kallinikos, 1996, 2004). This forces companies to either restructure business processes to align them to structural aspects of the ERP technology (Dillard & Yuthas, 2006) or to integrate only some elements of their management and cost accounting practices into the ERP system (Boersma & Kingma, 2005; Granlund & Malmi, 2002). These studies highlight the issue that ERP packages tend to involve

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constraints on choice and actions within which the implementing organizations have to operate.

ERP technologies provide managers with certain choices as to whether they can configure the system for logistics or accounting (Dechow & Mouritsen, 2005; Hyvönen, Järvinen, Pellinen, & Rahko, 2009); Just-In-Time management or planning raw material purchases in advance (Boersma & Kingma, 2005); or whether they can approach the system in terms of ''virtual integration'' or ''pipe-line management'' (Hyvönen, Järvinen, & Pellinen, 2008). Furthermore, social, political, and managerial agendas integral to the implementation process link these constraints and further limit the functionality of ERP systems (see e.g., Dechow & Mouritsen, 2005; Hyvönen et al., 2008; Quattrone & Hopper, 2005). Consequently the working of ERP systems involves a list of things that one can or cannot do with it and accompanying practices of sidestepping parts of the system and/or using self-developed supplements to it (Christiansen, Kjærgaard, & Hartmann, 2012; Dechow & Mouritsen, 2005). In this way ERP technology has been shown to have the potential to become ''a recalcitrant ally'' that organizational members need to deal with (Kallinikos, 2004, p. 7).

In this study we argue that the dilemmas and choices of ERP system implementation reported in the extant literature can be perceived as outcomes rather than trigger points in system development. A considerable body of research has investigated how organizations configure ERP technologies and the perceptions users have of them as determined by the actions they permit or restrict. This, we argue, gives a perspective on ERP systems that is primarily focused on the outcomes of the system, thereby neglecting the underlying context in which these technologies are developed. It is important to look at the development process and engage both users and developers of ERP technology in order to understand the underlying agendas and concerns that dictate the use of the system. The principal definitions and protocols of ERP packages tend to be formed before implementation and configuration choices arise for managers (see e.g., Locke & Lowe, 2007). Failure to investigate the actual creation of ERP technologies entails a risk of overlooking the underlying mechanisms inherent to those technologies. It is those inherent characteristics that shape the opinions of users of the ERP systems, and have a variety of consequences for organizational practices.

Therefore, in this study we take a closer look at the ERP system development to investigate the process of creating specific functionalities before they become incorporated as functioning modules of an ERP system. We study the development of technology as a process of inscription, which can be defined as a realization of an organizational space in the form of signs (Latour & Woolgar, 1986; Latour, 1999). This involves investigating how elements and actions in organizational space are materialized in the form of a technological script that can be mobilized in support of managerial and accounting objectives. The investigation is conducted through a single case study in a food manufacturing firm where specific functionalities of an ERP technology have been created, rather than merely implemented, to serve a central planning system and provide performance measurement for a manufacturing space.

The case study shows that while managers and users of the ERP system experience various benefits stemming from that system's ability to produce accounting measures, there is nevertheless a sense that the system is perpetually incomplete even after several years of development and use. The study contributes to the existing literature by explaining how this sense of incompleteness is connected to the act of reducing the world to signs (Latour, 1999) and how the activities of ERP system development aim to reduce this sense of incompleteness. More specifically, the study demonstrates how organizational members along with IT developers experience and compensate for the incompleteness of technology in three respects: by adding more particularity, by trying to restore continuity and by compensating for the loss of multiplicity. In their own way, each of these attempts leads to the production of more inscriptions and adding layers of activity to the ERP system that its users must then deal with.

The remainder of the paper is organized as follows. The next section provides the theoretical background of the study and explains the development of a technology as an inscription. The third section introduces the research approach and data collection activities. The fourth section introduces the empirical setting and analyzes the process of developing the performance measurement system with the accompanying functionalities of Axapta technology. Finally, the last two sections discuss the contributions and implications of the study and present its conclusions.

Theoretical background

Several studies have investigated the processes of ERP implementation showing the considerable effort involved in arranging and configuring such technology (e.g., Boersma & Kingma, 2005; Dechow & Mouritsen, 2005; Dillard & Yuthas, 2006; Hyvönen et al., 2008). ERP systems have been shown to have considerable impacts on organizations, which are often compelled to accept the structures determined by the technology involved. Dechow and Mouritsen (2005, p. 730) state that, ''Technology acts by forcing other actors to take its categories seriously.'' ERP technologies necessitate elaborate ''itineraries'' of organizational action, requiring standardization of activities and objects in the organization in order to fit them to the instrumental rationality of the technology (Dillard & Yuthas, 2006; Kallinikos, 2004). Some studies have shown how this brings about benefits in standardizing knowledge and accounting practices in the organization (e.g., Hyvönen, Järvinen, & Pellinen, 2006), while others have outlined the challenges that are created for organizational practices (e.g., Boersma & Kingma, 2005; Dechow & Mouritsen, 2005). For instance, Boersma and Kingma (2005) show how the inability to redesign the logistics processes for raw materials according to the principles of the ERP system led a group of managers to decide to shut down the material planning module of their ERP system entirely and revert to manual management controls. In a similar vein, Christiansen et al. (2012) and Dechow and Mouritsen (2005) have highlighted how organizational members create workarounds in less than optimal ERP systems to be able to extract the required information.

One of the causes of rigidity in the technology is often rooted in its initial development. Designers in institutional settings develop a vision for the technology while making assumptions about what the world into which the technology will later be inserted is like (Arkich, 1992). Another cause is