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ORIGINAL PAPER

Accounting information system innovation in interfirm relationships

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Abstract Over recent decades, contributions in management accounting have investigated the form of controls that are suited to situations of strategic alliances with suppliers, analyzing the role of accounting tools, such as accounting information system (AIS), in supplier selection. On this field, we focus on the role played by AIS innovation in selecting suppliers and how it is performed (produced, modified and accepted). In our interpretation, AIS is seen as a process of translation not just an accounting tool because it both represents and also explains reality. More specifically, we consider AIS as a boundary object which enables alliances between actors helping them to highlight their own interests and to solve controversies. In this sense, AIS is interpreted as an actor contributing to the creation of an accounting space where all the actors' interests meet and are put into act in reality. Drawing on actor network theory (ANT) as a proper method theory, we attempt to study the dynamics between actors (human and non-human) directly involved and their interactions in the AIS innovation process. In doing so, we carry out a longitudinal case-study at a manufacturing firm located in the south of Italy, where we examine the role of AIS innovation in the supplier selection. We use the ANT lens to provide an understanding of the role played by AIS innovation as a boundary object.

Keywords Innovation · AIS · Boundary objects · Performance measures · Actor network theory

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1 Introduction

Over recent decades, management accounting researchers, focusing on interfirm contexts have analyzed the forms of cooperation among partners and the role played by management accounting in these contexts (Koufteros et al. 2012; Wu and Barnes 2011; Dekker 2007). Studies have showed how accounting information system (AIS) can be useful in improving the information exchange which is crucial in managing interfirm relationships (Cuganesan and Lee 2006). In doing so, some contributions have analysed how this cooperation leads partners to exchange accounting information, investigating the role of information technology (IT) in increasing supplier accountability, effectiveness and efficiency (Evans and Wurster 1997). However, to the best of our knowledge, no studies have investigated the role of AIS in facilitating buyers to effectively select their suppliers. Thus, in this paper we will investigate the role of new AIS in managing supplier selection and how it is performed (produced, modified and accepted). In doing so, we interpret AIS not just as an accounting tool which explains reality but as a boundary object which supports actors as they present their interests and facilitates the creation of alliances between them.

In line with this view, we attempt to reposition, or even rehabilitate, accounting technologies in the sociological explanation (Justesen and Mouritsen 2011). Even if management accounting innovations have been examined as playing an important role in the construction or enforcement of inter-organisational processes (Vosselman 2014; Mouritsen and Thrane 2006), further research in the field of AIS is needed to give better understanding of the role played by AIS innovation in facilitating supplier selection. In doing this, we interpret AIS as a managerial tool which performs the reality through its re-presentation as creation, entailing mediation among actors involved in the supplier selection.

Drawing on actor network theory (ANT) as a proper method theory (Lukka and Vinnari 2014) we carry out a longitudinal case-study at a manufacturing firm located in the south of Italy, where we examine the role of new AIS in its supplier selection from 2012 up to 2014. The case description shows how ANT offers useful insights into the interpretation of AIS as a boundary object (ideal type objects and the standardized forms), which, through accounting inscriptions, makes transactions visible, defines their 'poles', and provides techniques to connect them. This AIS innovation leads to the monitoring of supply performance, mitigates the emerging controversies while creating new allies, and mobilises all actors' interests. Drawing on Busco and Quattrone (2014), we identified four major features that characterize the adoption of a new management accounting practice: its ability to provide clear visual representations of the interfirm calculable space; to create order and knowledge; to accommodate different interests through a process of interrogation and re-invention, and (4) to stimulate the engagement of all actors through participation in a series of recurrent activities.

The paper is structured as follows. Firstly, we describe the management accounting innovation as a boundary object; secondly, we offer a brief literature review on AIS innovation in interfirm relationships. Later, we describe the research method which

guided the explanatory case-study, providing the field evidence and offering an interpretation of it based on the theoretical arguments previously developed. Finally, we conclude the paper with some reflections.

2 Management accounting innovation as a "boundary object"

Contributions on management accounting have variously identified management accounting innovation for its novelty and usefulness in addressing specific needs and for its ability to add value in comparison to existing solutions (Kaplan 1998; Benner and Tushman 2003; Lapsley and Wright 2004; Birkinshaw and Mol 2006; Damanpour et al. 2009). Studies, which have adopted a functionalistic approach, have highlighted that the relationship between diffusion and the presumed benefits to organizations of adopting accounting innovation is not always linear or direct (Chenhall and Langfield-Smith 1998; Ittner et al. 2002). They show how the benefits of such innovation can be attributed to the ability of human agents to recognize and assess them rather than to the influences of other contextual factors (Strang and Macy 2001). Other contributions, focused more on institutional approaches, have analyzed the institutional conditions and attitudes of major groups of influence that promote the emergence and diffusion of management and accounting innovations in order to demonstrate that a firm can act rationally (Powell and DiMaggio 1983; Abrahamson 1991; Abrahamson and Fairchild 1999). In doing so, Birkinshaw et al. (2008) focused on the roles of key change agents inside and outside the organization in driving and shaping four processes (motivation, invention, implementation, and theorization and labelling) that collectively define a framework for interpreting how accounting innovation comes about.

Examining both the processes of adoption and diffusion of management accounting innovation, some studies have attempted to integrate the different explanations provided by these approaches. One such attempt was offered by the contribution of Barley and Tolbert (1997), who, drawing on the structuration theory (Giddens 1984), analysed how individual agencies and social structures contribute to the shaping of processes of adoption and diffusion.

Thus, exploring the issue of management accounting innovations it can be claimed that changes are often unstable and heterogeneous, so the same managerial and accounting practice can be implemented in different organizations in different manners (Burns and Stalker 1961; Drucker 1994; Benner and Tushman 2003; Bisbe and Otley 2004; Kunz and Linder 2015). Yet, successful managerial and accounting innovation is able to fully engage multiple users and to diffuse world-wide (Birkinshaw and Mol 2006; Busco et al. 2015; Cinquini et al. 2015).

Some contributions in management accounting literature, which have adopted a more critical approach, have shown how the actor network theory (ANT) can be helpful in understanding how management accounting innovation comes to be performed in organizational contexts.[1] In doing so, ANT has been used by accounting researchers

[1] The interest in ANT among accounting researchers is related to a growing interest in sociology in the field of accounting since the beginning of the 1980s. For an accounting literature on contributions of ANT-inspired accounting research we refer to Justesen and Mouritsen (2011).

(Robson 1991; Miller 1991; Preston et al. 1992; Chua 1995) to wonder how reality and more specifically, its representation by accounting numbers, come to be socially constructed. Case studies have highlighted how management accounting tools are constructed to accommodate and persuade a multitude of interests within organisational contexts. In line with this, Preston et al. (1992) and Chua (1995) argue that the construction of budgeting within hospital settings involves co-opting the interests of medical practitioners, hospital administrators and policy setters. ANT has been described as "ontologically relativist in that it allows that the world may be organised in different ways" (Lee and Hassard 1999, p. 392). For ANT, scientific and technological innovation, social relations and patterns, and organisational arrangements are not predetermined, nor do they possess inherent or essentialist characteristics. Instead, they are constructed and performed through networks of heterogeneous elements comprising both human and non-human entities, working towards some collective purpose (Latour 1986). So, ANT has repositioned calculations at the heart of accounting research rather than being marginalized and subordinated to material, ideological, professional and political conditions or personal interpretations of accounting (Justesen and Mouritsen 2011). One possible advantage derives from ANT's insistence that inscriptions and calculations are central to explaining activities and are not just the effects of conditions and contexts even though accounting entities derive their power from associations between calculations and conditions (Latour 1986). Applied to accounting research, ANT poses a challenge to agency, functionalist and contingency perspectives, interpreting accounting innovation as a process of change which is not the result of linear, rational improvements or functional adaptations to new demands in a changing environment. Instead, accounting dynamics are viewed as the outcome of historical, contingent processes in which new accounting constellations (Miller 1991) appear because heterogeneous elements, such as different actors, human and non human, are brought together at a particular moment in time. Besides this, ANT offers a useful contribution to management control literature explaining management control in two ways: firstly as 'accounting in the making' and secondly as 'accounting in action' (Alcouffe et al. 2008). Contributions that have interpreted management control as 'accounting in the making' have argued that the processes of accounting practices are produced, modified and accepted, and their translation processes bring others to accept as fact accounting systems and their solutions (Bloomfield et al. 1992; Preston et al. 1992). The aim of translation processes is for facts and accounting practices to be accepted by users and providers without modifications. Management control as 'accounting in action' means that accounting information is regarded as an inscription that 'acts at a distance' (Chua and Mahama 2007; Cuganesan and Lee 2006; Quattrone and Hopper 2005; Robson 1991, 1992). When an accounting tool designed for a specific function enters a network, its capability and the function is determined by that network.

This paper focuses on using ANT to understand the role of AIS and how it is performed (produced, modified and accepted) as accounting in the making.

A recent contribution on ANT offered by Busco and Quattrone (2014), focusing on attributes of the control practices as "objects", identified four major features that characterize the adoption of a new management accounting practice. They argued that innovation is facilitated by its ability to create a space where (1) complex issues are

translated into clear visual representations (2) order and knowledge can be classified and innovated (3) different interests can be accommodated through a constant process of interrogation and re-invention, and (4) engagement can be sustained through participation in a series of recurrent activities (Busco et al. 2015). The introduction of a new managerial practice is also characterised by the interplay of a variety of interests, sets of knowledge and best practices which influence the innovation process and its results (Colwyn Jones 1992; Quattrone and Hopper 2001).

Thus, considering the multitude of economic and organizational realities as a result of the interplay between calculations and discretion within accounting practices (Quattrone and Hopper 2001), we can argue that management accounting should create change and this change is re-defined as a movement of drift, that recognizes the incompleteness of change. These considerations, according to ANT perspective, then lead to an investigation of how accounting innovation, and more specifically AIS, is produced, modified and accepted, interpreting AIS as the result of a translation process, characterised by the accomplishment of four moments: problematisation, interessement, enrolment and mobilisation (Mouritsen 1996; Burns and Vaivio 2001; Emsley 2008; Baxter and Chua 2008; Alcouffe et al. 2008).[2] It is during the interessement phase that the actors notice and accept the usefulness of the innovation and connect an advantage to it. In doing so, the *boundary objects*[3] support various actors in presenting their interests and viewpoints, in an effort to persuade allies to support their ideas and innovations (Star and Griesemer 1989). Those actors enrol the innovation to form supportive, but temporary and fragile networks (Latour 1987; Briers and Chua 2001; Pipan and Czarniawska 2010). Actors, through boundary objects, construct interfaces between theirs and other actors' interests and identify the range of choices that is available to them by change or innovation (Callon 1986; Chua 1995; Windeck et al. 2015).

Specifically, Briers and Chua (2001) have identified five types of boundary objects: repositories, ideal type objects, coincident boundaries, standardized forms, and visionary objects. Repositories can store data accessible to a wide range of users, who make use of them for very different purposes. They provide a common reference point of shared definitions for solving problems across groups of actors, e.g. organizational functions (Carlile 2002). Ideal type objects are characterized as hard on the outside and plastic on the inside, which allows them to be moulded to suit different interests and

[2] Problematisation refers to the identification of a problem or necessity by the enrolling actor, who pushes for change and guides the translation process. The latter identifies the solution (the obligatory passage point—OPP) which embraces the actors' interests. In the interessement phase, the enrolling actor tries to engage actors' interests using interessement devices in order to disassociate them from other possible solutions. In the enrolment phase negotiations are needed between the enrolling actor and the other actors in order to determine their complete involvement, creating the network. Finally, in the mobilisation phase all interests are mobilised and represented by the innovation introduced. If the innovation does not represent the interests of all the actors involved, its introduction fails.

[3] "Boundary objects are objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in local use. These objects may be abstract or concrete. They have different meanings in different social words but their structure is common enough to more than one world to make them recognizable, a means of translation" (Star and Griesemer 1989, p. 393).

requirements. They allow change and innovation to be translated across borders of networks with diverse interests. Coincident boundary objects, e.g. functional boundaries of an organization, allow for different internal content and thus enable specialization in the midst of larger entities. Standardized forms, like standard operating procedures or software packages, act as guides for approved action. Finally, visionary objects provide a high level of legitimacy and authority (Briers and Chua 2001, p. 242). These boundary objects are understood as taken-for-granted artefacts and common languages that are conditional to a membership in a community of practice or to an organisation (Windeck et al. 2015).

In accordance with the previously cited literature, the present contribution aims to shed light on the role of AIS innovation and how it is performed (produced, modified and accepted), in the supplier selection. More specifically, the innovation of AIS is viewed as a process of translation where the new features of AIS act as boundary objects, that both help to build interfaces between all actor interests and support the process of management accounting change promoted by the innovation. In doing so, we interpret AIS as a platform which offers a space wherein order and knowledge can be continuously classified and questioned, different interests can be accommodated through regular processes of interrogation and re-invention, and engagement can be sustained through participation in a series of recurrent activities (Busco and Quattrone 2014). These features of AIS enable an improved visualisation of information, which can improve the decision process related to the selection of suppliers. By looking at AIS innovation as "boundary object" characterized by distinctive features, we are able to focus on the enabling nature of innovation as it develops and unfolds in practice.

3 AIS innovation in interfirm relationships

The relevance of interfirm relationships in recent years has produced growing research interest in supply partner selection considered as a source of competitive advantage, which can influence the buyer firm performance (Dekker 2007; Wu et al. 2009; Wu and Barnes 2011). Cooperative interfirm relationships lead to the creation of accounting information flows between firms, and guide the partner firms to modify their AIS, in order to effectively communicate (Cuganesan and Lee 2006). In particular, the selection of suppliers based on their quality and cost capabilities can enhance the buyer's competitive performance capabilities in the matched domains of buyer product innovation, quality and competitive pricing (Koufteros et al. 2012). In doing so, AIS and more specifically IT, increases supplier accountability, enabling the continuous assessment of supplier effectiveness and efficiency (Evans and Wurster 1997).

The AIS field has been characterised by studies focusing on information technology (IT), and by other contributions which have investigated the role of AIS innovations on managerial practices. For example, Scapens and Jazayeri (2003) analysed the introduction of SAP in the European division of a large US multinational as a managerial innovation, highlighting how the new SAP facilitates the transition toward a process orientation by reinforcing team-work and cross-functional integration, which were necessary for the management of the business processes.

The facilitating role of AIS is also supported by the contribution offered by Caglio (2003) who focused on the accessibility of accounting information fostered by the introduction of the ERP system. This last is interpreted as an innovation which provides "the most relevant data and information but also (ensures) the most appropriate presentation form for (accountants) own purposes" (Caglio 2003, p. 144).

As with the ANT, the existence of AIS innovations is impossible in the absence of networks in which it is embedded. In this view IT might be interpreted also as an actor in the network in which it plays an active role (Dechow and Mouritsen 2005; Quattrone and Hopper 2005, 2006). IT represents a non-human actor in the organizational and inter-organizational networks which facilitates and constrains information flows and thereby decision-making and management control. In this way IT might have the power to affect many organizational practices. As previously mentioned, in an ANT view, technological innovations are not predetermined, they are constructed and performed through networks of heterogeneous elements, human and non-human entities, working towards some collective purpose (Latour 1987).

Cuganesan and Lee (2006) investigated the role of IT innovation in the interorganisational context, analysing how the network constructors might act at a distance. The network builders utilised devices that collect and/or produce inscriptions as numerical or visual representations of information (Latour 1987). Thus, "centres of calculation are strengthened through their ability to accumulate and combine inscriptions of behaviour, perform calculative work upon these inscriptions and mobilise resources and enact long-distance control over distant peripheries" (Cuganesan and Lee 2006, p. 147) In line with this, IT information technology innovations "acted as an inscription device, offering novel information possibilities that resulted in a refinement and greater utilisation of accounting controls, and new visibilities into supplier performance" (Cuganesan and Lee 2006 p. 165). The notion of inscriptions has been usefully applied to explore the role of AIS as case-mix and activity-based costing technologies (Chua 1995; Briers and Chua 2001) and information systems and technologies more generally (Bloomfield 1991; Bloomfield et al. 1992; Doolin 1999). In fact, the AIS produces "scripts", which represent visions or predictions about the world in which it will operate. This involves decisions about the identity, preferences and characteristics of the users of AIS, and the manner in which it will be used. This matter is directly related to the application of IT which takes a role in shaping organizational arrangements (Granlund and Mouritsen 2003; Granlund 2011).

Although the use of IT in managing the supply chain process has drawn increasing attention, there is a lack of questions as to how IT may enable organisational actors to mobilise a 'dialectic of control' over the decision making process (Orlikowski 1991). The recognition that the agency of actors may introduce a dimension of flexibility into mechanisms of control has significant implications for investigating the interaction of AIS and IT within interfirm relationships (Cuganesan and Lee 2006). A relevant aspect could be to better understand the role of AIS and how it is performed in supplier selection.

The ability of AIS to generate, codify and represent information has been described as resulting in enhanced control and monitoring beyond the legal boundaries of the firm. In doing so, IT which underpins AIS, cannot be a stable black-boxed technological artefact but becomes an actor, which can extend and mobilise networks of

relations. The visibility is constructed by users, information and accounting. In line with this, Quattrone and Hopper (2006) have questioned how IT materialises, suggesting that it should be interpreted as less than a reified physical entity but more than a social construction or individual enactment. A deeper understanding of the shaping of socio-technical systems and the change of contexts is relevant to AIS research (Gao 2007; Bengtsson and Agerfalk 2011). In this sense, the performative perspective shows shifting networks of related actors, both human and non-human, using management accounting information in a relational drift of practices (Andon et al. 2007). As a result of these relations with others, actors acquire their forms and attributes. In order to study the role of AIS innovation in managing interfirm relationships, it is necessary to study the 'socio-technical agencement' in which it is introduced. Within these collectives the course of action is influenced by all the actors. The enrolment of AIS in daily practices depends on the discretion of both inter and intra organisational participants. So, a process of interessement has to take place in order to influence the discretion of these participants. If, in practice, AIS helps to stabilize the course of action and gives it a certain solidity, it can evolve into an Obligatory passage point (OPP).[4] Whether AIS becomes an OPP however depends on several considerations; on its development in practice, the power of the actors who introduce it and the appeal it has to other actors and, thus, if they choose to use to AIS or not. Drawing on ANT (Latour 1987, 2005; Callon 1986) we try to better understand the role of AIS innovation and how it comes to be performed in the supplier selection. Specifically, we use ANT to examine the mobilisation of accounting calculations, as one type of non-human actor, including the effects of the implementation of accounting technologies (Briers and Chua 2001; Emsley 2008). The AIS innovation is interpreted as a boundary object which supports all actors involved in the supplier selection process as they present their interests, constructing interfaces among them and creating allies. Drawing on Busco and Quattrone (2014), we analyse the AIS innovation features (visual performable space, method of ordering and innovation, means of interrogation and mediation and motivation ritual) to understand how this kind of innovation engages, unfolds and is practiced. The appeal of utilising ANT is that it places calculation at the heart of the accounting research that draws upon this perspective (Justesen and Mouritsen 2011).

4 Research method

In order to improve our understanding of the role of AIS innovation in selecting suppliers, we carried out a case-study at a manufacturing firm located in the south of Italy, from 2012 up to 2014. According to Yin (1989, p. 23) a case study should be viewed as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used". Qualitative research, accentuating interpretations of people's intents (Denzin and Lincoln 1994; Patton 2002), is

[4] The concept of obligatory passage point (OPP) was developed by Callon (1986) and can be thought of as a means that forces the actors to converge on a certain topic, purpose or question. The OPP thereby becomes a necessary element for the formation of a network because it mediates all interactions among actors involved.

appropriate for describing how individuals view the world by identifying the relevant spectrum(s) of the paradigm that guide the research design and data collection efforts.

In this view a case study is not intended to represent samples. Instead, it is used to expand and generalize existing and emerging theories (analytic generalizations) by offering common explanations of events or identifying multiple events that possess similar theoretical features (Eisenhardt 1989; Yin 2003; Parker 2012).

Following on from this, we interpret ANT as a proper method theory[5] (Lukka and Vinnari 2014) to provide a better understanding of the dynamics of AIS innovation, highlighting the actors (human and non-human) directly involved in selecting suppliers. Applying ANT as a method theory means using a sociological vocabulary and syntax, which are, at least with adaptations, applicable to another disciplinary domain (management accounting research). The typical aim in employing applicable parts from a method theory is to offer an alternative perspective and form a lever for gaining new insights, which can be more specific but also lead to more abstract or general conclusions. Considering the nature of ANT as a method theory, it offers particular rules of method and principles (Latour 1987) for researchers who wish to explore processes of construction such as management accounting innovation in a specific field. In this sense, ANT provides one type of a priori lens through which the world can be viewed.

The manufacturing firm under study has been operating since 1960 in the non-alcoholic drinks market recording a turnover of 107 mln euros and employing about 200 people. Its main business is the production and commercialisation of specific products of a multinational company brand a under a franchising contract. In recent decades, the manufacturing firm has become increasingly complex from an organisational point of view and this has entailed a reengineering of its internal processes, and AIS innovation. This manufacturing firm was chosen mainly for the complexity of its inter-organisational context where it plays a leading role due to the characteristics of its products, its contractual power and its strong reputation built up under the franchising contract.

Regarding the methodological aspect, the research can be categorised as "ex post facto" (Lukka and Vinnari 2014) as it was conducted after the analysed events, excluding real-time elements and the active participation of the researchers in the events. The case research followed a retrospective approach, intended to grasp subjects' perceptions of the AIS in interfirm relationships (Scapens 2004). We collected archive data from internal documents (product characteristics report, performance reports, orders and supplier reports), field data came from twenty semi-structured interviews (lasting an hour and twenty minutes on average) conducted over the years 2014–2016 with the general director, the purchasing manager, the controller, the production manager and the maintenance supplier.

The interviews aimed in the first phase to collect evidence on the manufacturing firm and its interorganizational relationships, by identifying their peculiarities. Secondly,

[5] Following Lukka and Vinnari (2014) we can identify two types of theories, domain theory and method theory. "Domain theory may be defined as the accumulated knowledge on a substantive topic area of a discipline such as accounting, while method theory refers to a meta-level conceptual system, or theoretical lens, which originates from another discipline such as organization studies or sociology" (Lukka and Vinnari 2014).

we tried to reconstruct the perceptions of each actor involved in the reengineering process, giving them the opportunity to describe how it happened and the criticalities that emerged throughout. Finally, we attempt to analyze the use of accounting information in the purchasing process and how such information has a role in interorganizational contexts, pointing out differences before and after the reengineering process.

The interviews were not type-recorded because of the confidential nature of the issues discussed (Kajüter and Kulmala 2005), and were conducted in an informal style; all were written down in a draft-report and shared with the interviewees. The limit of relying on retrospective approach consists of asking interviewees to describe, explain and reflect on events they have experienced (Nor-Aziah and Scapens 2007). We contain this through methodological triangulation.[6] An important aim of data analysis, was distinguishing human and non-human actors. To do this, we firstly identified the main interest through which each agent was identified, and then we classified the various interests in line with perceptions emerging from the interviews.

The above-described methodology allowed us to explore accounting as a socially constructed phenomenon, through which actors participate in social construction of realities (Parker 2012). Understanding reality as socially constructed supports the use of qualitative techniques, which enable researchers to investigate 'from within the subject of study' to understand the process of social change. In this field, Van der Meer-Kooistra and Vosselman (2006) suggest that the aim of qualitative studies is to understand how the structures and practices of management accounting interact among themselves and affect some changes in organizations or organizational relationships.

5 The role of AIS innovation in the process of selecting suppliers

We analyse AIS innovation as the result of a process of translation, in which we observe the four moments of *problematisation, interessement, enrolment, mobilization*, recognising the actors involved and how their interactions can affect the role of AIS innovation for supplier selection. In doing so, we first illustrate the case study background by drawing attention to the reengineering of the purchasing process which characterized the manufacturing firm. Later, we describe the role of AIS innovation in selecting suppliers.

5.1 Case study background

In the manufacturing firm the purchasing process was characterised by the following steps: goods/service selection; supplier identification; purchase features and terms of payment negotiation; planning of delivery time, order monitoring and administrative processing. Each step required the interaction of human and non-human actors: the

[6] Denzin (2006) identified four basic types of triangulation: data triangulation, which involves time, space, and persons; investigator triangulation, which involves multiple researchers in an investigation; theory triangulation which involves using more than one theoretical scheme in the interpretation of the phenomenon and finally methodological triangulation which refers to use more than one method to gather data, such as interviews, observations, and documents. In our research we followed a methodological triangulation in order to facilitate validation of data through cross verification from two or more sources.

purchasing department, top management, the production manager, the suppliers, the franchisor, the franchising contract, and SAP system. In the selection of suppliers', the manufacturing firm must consider technical and quality conditions established in the franchising contract which includes a list of selected suppliers that meet the Franchisor's sustainability policies. The selected suppliers were required to run a test supply which was evaluated by using specific performance measures coming automatically from the SAP. If the appraisal was positive the supplier became "qualified" and the purchasing department processed the order, otherwise the selection of suppliers had to start again. The subsequent steps of the purchasing process were managed by the purchasing department. A number of problems to do with punctuality and efficiency emerged which were mainly caused by misunderstandings among the managers due to the lack of systematic information and the absence of formalised criteria for selection.

In the 2012, some meetings were organised between top management and all functional managers in order to better understand the problems relating to information sharing in managing the purchasing process. The production manager suggested that the management of the purchasing process could be improved in terms of efficiency and quality if more attention was given to some aspects of the supply such as quality, time of delivery and service level. At the end of 2012, the top management proposed a reengineering of the purchasing process engaging all functional managers in defining a new configuration of the purchasing department activities and responsibilities. The top management assigned a leading role to the purchasing department in coordinating all the actors involved and in identifying an expert for each step of the purchasing process, on the base of production manager's competencies. In doing so, the controller suggested rethinking the SAP by introducing new performance measures jointly entrusted to the purchasing department and the production manager. We illustrate the SAP innovation in supplier selection, interpreting it as an actor-network.

The supplier selection was more complex than it appeared because of the different supply types. These were classified considering their strategic relevance in terms of their impact on costs and revenues and how far they generated additional value to each product. Furthermore, the suppliers were also classified according to their availability, their technology, and market complexity. In doing so, the top management, the purchasing manager and the controller jointly worked in defining the following categories: "strategic", "leverage" and "non critical"[7] supplies. In order to better understand how the management accounting innovation happens, we focus only on the "strategic" supplies because of their relevant effects on buyer firm costs and revenues and considering that they were a more numerous actor-network than the others (i.e. raw materials, consulting supplies, maintenance services). These supplies are managed by the needs of the production department which had an important role in defining all contractual and commercial conditions.

[7] The "leverage" supplies were distinguished for their effects on the buyer firm costs and revenues even if they were characterised by low availability. These supplies are managed by the needs of each functional department which had an important role in defining all contractual and commercial conditions. This category included packaging and maintenance supplies. The "non critical" supplies had low effect on the buyer firm's profitability and were characterized by high availability. These supplies were selected with respect to the buyer firm's efficiency criteria. Logistic services, stationery and others were included in this category.

5.2 Translating AIS in the inter-organisational context

Before the reengineering of the purchasing process, the functional managers were all involved in each step of the purchasing of strategic supplies firstly because of the strategic relevance of these supplies and secondly because all of them could provide expertise in judging the reliability of suppliers in satisfying technical and quality requirements.

The negotiation of all contractual conditions was managed by the production manager whereas the purchasing department simply settled delivery and payment conditions without having the opportunity to compare the chosen supplier's offer with other market offers. Therefore, the purchasing department was not able to effectively ensure optimal price conditions: "Our department did not have any visibility of supplier's quality … we did not understand why the production manager sometimes chose a more expensive supplier! … during the meeting with the top management, we usually spent a lot of time arguing about negative effects of supplier selection in terms of increasing costs…" (purchasing manager).

The main problem related to the lack of coordination and information sharing between the production manager and the purchasing department since the suppliers were contacted directly by the production manager. The latter also centralised all phases of purchasing process on his department, and left little room for the purchasing manager.

As shown in Fig. 1, which offers a visualisation of the supplier selection process, the production manager managed the first three steps of the supplier selection and the supplier test was approved if the technical and quality conditions required by the franchising contract were satisfied. During these phases the supply test was also evaluated by using interorganisational performance measures drawn automatically from the SAP. This meant that the actors involved in the supplier selection process were not able to identify some of the interorganisational performance dimensions and related measures. All supplies were evaluated using the same performance measures. Little room was assigned to the purchasing manager who managed only the processing of the purchase order and the administrative activities.

During the final annual meeting of 2012, the general director argued: "The collaboration between functional managers should allow us to take advantage of their

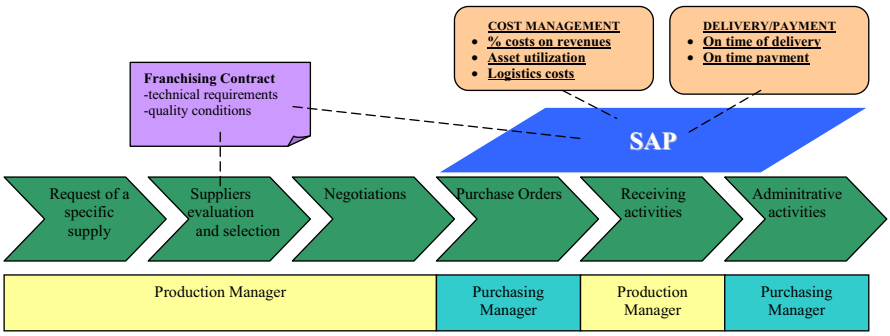

Fig. 1 The purchasing process before the reengineering

expertise regarding technical and quality aspects and, at the same time, to realise some cost savings thanks to the benchmarking expertise of the purchasing manager, who is able to identify the best price for the required supply." Regarding this aspect, the controller also highlighted: "The coordination problem was due to the lack of systematic information sharing among all functional managers…The general director required some information regarding both supplies' costs and quality in order to evaluate how they affect the firm's performance…. It was difficult to elaborate a cost and quality reports because the quality information was not included in the SAP …in addition we need a report that can extract the appropriate data, summarise it, and deliver it in a manageable and recognisable format. … we want to avoid a situation where every section develops its own reports…". The purchasing department complained about the absence of information regarding supply and about the production manager's feedback, which would have helped in understanding the kind of supply required. The lack of systematic information was also underlined by the suppliers who complained about the selection process because its criteria were not completely clear as stated by a maintenance supplier: "sometimes we do not have the possibility to clearly understand how they selected and evaluated us! A deeper understanding of the selection criteria could provide ideas of some changes or improvements both on the characteristics of our services provided and on the measures used for our evaluation". Complaints about SAP led to the decision to involve managers more in determining what information it should provide. For SAP to give visibility to other 'things' (e.g. costs, delivery times), it had to engage 'other' actors.

The emerging of the above mentioned problems led to "the problematisation", which represented the first stage in the translation process. It was strictly related to unclear identification of actors' responsibilities in the purchasing process and to the absence of systematic information sharing in supporting the actors' decision-making. In particular, the main problems were linked to misunderstandings among the managers and to the lack of formalized criteria, which provoked promptness and efficiency problems. In these phase, the top management positioned itself as a central and indispensable actor within the actor-network, suggesting as a common solution for the actors' problems the reengineering of the purchasing process supported by a new reconfiguration of the SAP in order to provide all actors involved in the supplier process with more systematic information.

After the reengineering the aim of the purchasing department was to eliminate redundant purchases, and achieve cost efficiencies. Thus, a more active role was also assigned to it in managing the supplies. Given the peculiarities of the strategic supplies mentioned above, the goods/service selection and planning of delivery time phases were assigned to the production manager who defined both technical characteristics of the supply and delivery time in order to avoid a production standstill. The lack of data availability had entailed a non homogeneous suppliers' evaluation, and required the production manager to be enrolled in the regular transmission of such data to the purchasing department in order to clarify the product/service characteristics required and to better evaluate supplier offers exploiting the negotiation abilities of the purchasing department.

In order to deal with these problems, the top management redefined the managers' responsibilities by the introduction of new performance measures in the SAP which

helped the actors involved to visualise suppliers' quality, delivery time and related costs through accounting numbers. These performance measures made it possible to monitor how the manufacturing firm was able to reach the strategic objects related to quality services and profitability. As argued by the purchasing manager: "we were directly involved in the supplier selection…since receiving the supplier list transmitted by the production manager, we evaluated each supplier in terms of price and payment conditions in order to satisfy the profitability objectives established by the top management… at the same time we had to find a compromise with the quality service characteristics required by the production manager! Several meetings were entailed to facilitate the supplier selection by the negotiation with the production manager." The reconfiguration of SAP provided all actors involved with more detailed information on supplies, improving the supplier selection process. The new performance measures helped to support actors' interests in identifying new forms of collaboration in both an intra and inter firm context.

The top management attempted to impose and stabilize the identity of the other actors using different devices (interessement phase). In particular, during the reengineering process several meetings were organized by the top management who called for strict cooperation between the production and purchasing managers. Interessement achieves enrolment if it is successful. "To describe enrolment is thus to describe the group of multilateral negotiations, trials of strength and tricks that accompany the interessement and enable them to succeed" (Callon 1986, p. 211). After the reengineering process supplier selection involved negotiations between the purchasing manager and the production manager taking into consideration both suppliers' expertise and supply prices, as illustrated in what follows: "in the February, when the production level is at its highest annual point,, there was a breakdown in some production machinery … there was the risk of a production standstill! Following the new procedures introduced by the reengineering of purchasing process, firstly, on the basis of our previous experience, we identified some suppliers who were able to immediately adjust our machinery … we shared the supplier list with the purchasing department! All identified suppliers could guarantee the same quality level." (production manager).

The negotiation on both purchase features and terms of payment, the order monitoring and administrative processing phases were entrusted to the purchasing department so as to exploit its negotiating abilities. Several meetings between functional managers and the top management sought to understand how to represent the aims of the firm's profitability and product quality through proper performance measures. Thus, the inter-organisational performance measures led the monitoring of supplies performance, allowing all actors to check the purchase order status, and to monitor the delivery time.

The new SAP furnished over time a number of purchase orders provided by the same supplier and the price trends, making the production manager aware of the negotiating abilities of the purchasing department which was able to cut costs by exerting the firm's bargaining power. In doing so, performance measures mitigated the emerging controversies, created new allies, and mobilised all actors' interests in optimising the purchasing process. Regarding that, the purchasing manager argued: "Now, the production manager shows us the respect of quality attributes on the new performance measurement report provided by the SAP we are more conscious of the

supplier's expertise…we felt more involved in the selection phase and we were able to find cheaper suppliers in the market who hold the same quality characteristics!!".

New windows created in the SAP helped with sharing all the available information about each step of the purchasing process, supporting also the coordination with the suppliers because the supplies performance measurement report was shared with them, as the maintenance supplier stated: "After the SAP reengineering we had the possibility to clearly visualize all performance measures linked to our supplies and to directly participate in their definition and revision… Now we were strictly linked with the manufacturing firm and we feel more deeply the network identity". This information sharing allowed the strategic suppliers to better identify the critical points in which they were weak, in order to effectively modify them. On this point the maintenance supplier referred: "the possibility of knowing the dimensions of performance in which we were evaluated and their trend over time gives us the chance to identify actions to improve such critical points promptly…at the same time the new information makes it easier to better define the responsibilities of each performance measure, by improving our client's capability to discover how and what he was responsible for in any performance!…..for example, loss of time was often linked to an unclear definition of supply peculiarities by the client".

The new SAP mediated the different actors' interests by visualizing supplier's quality, delivery time and costs. Furthermore, the coordination problems between the production and purchasing managers were resolved by the intrafirm sharing of SAP performance report, which clearly represented the interests of all actors involved. All users were able to personalise the content of SAP windows in order to provide accounting information flows which facilitated the supplier selection. The case evidence shows how the actors' approaches evolved during the reengineering of the purchasing process, becoming more heterogeneous, shaped by the role that had been assigned to the purchasing department in managing the purchase and the role played by the SAP innovation.

As shown in Fig. 2, the introduction of new calculable space linked together diverse purchasing arenas and levels via SAP, mediating the interests of all actors involved and solving some controversies, which had previously emerged. Accounting abstractions became vital for defining what should be framed and seen on SAP. In this view SAP relied on accounting inscriptions to make transactions visible, to define their 'poles', and provide techniques to connect them. New inter-organisational performance dimensions were identified which could improve supplier evaluation by considering some aspects that had been absent before the reengineering of the purchasing process. As illustrated in Fig. 2, quality performance measures such as "accuracy of test supply", "order compliance", "fill rate" and "flexibility" were introduced. The new SAP was able to represent the interests of all actors involved in the supplier selection process. Thus, SAP innovation, through the new performance measures mobilised, "intervened and created supplements that change the conditions for the design to work, and interfered by framing what was desirable, apparently achievable, and counted as an object" (Mouritsen 2005).

Through SAP innovation, the inter-organisational performance measures led to the monitoring of supply performance. All actors involved in the purchasing process were able to check the purchase order status, monitor the delivery time, the supplier lead

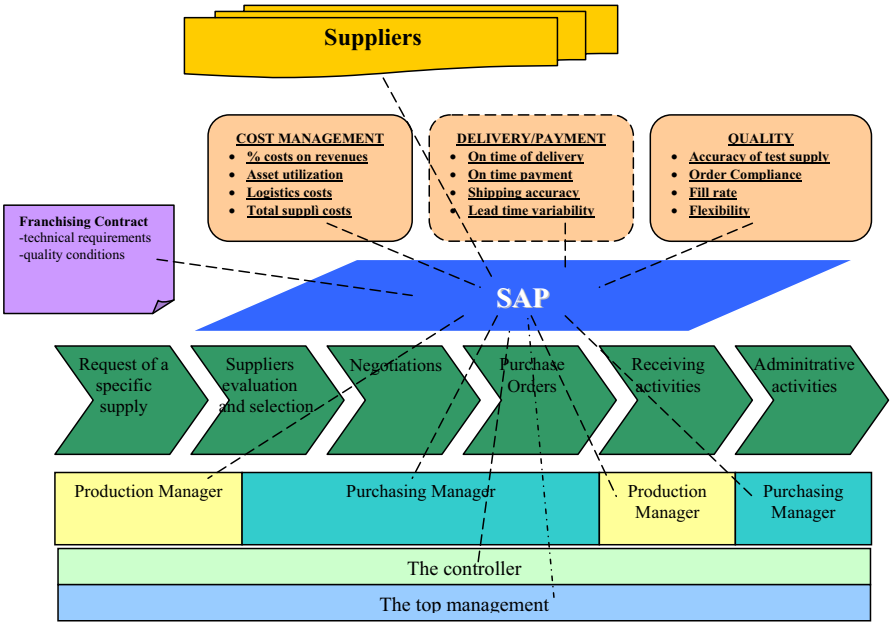

Fig. 2 The purchasing process after the reengineering

time, the total cost supplier, the supplier fill rate, the order compliance and the shipping accuracy. Through the supplier report, all actors were more conscious of the current supplier's performance comparing it to the target fixed for each performance measure. This information played an important role in supporting the decision process with reference to the possibility of maintaining or substituting a supplier.

The SAP innovation also allowed the observation over time of the number of purchase orders provided by the same supplier and the price trends. This report gave the production manager an awareness of the negotiation capabilities of the purchasing department which gain the cost saving by exerting the firm's bargaining power. Corrective actions, suggested to the suppliers by the production manager or jointly identified, improved the partnership, and overcame all misunderstanding, integrating all the actors. This new solution was identified by paying attention to the needs of the actors involved, the main product/services features and by observing the lack of systematic information available from the old configuration of SAP. The performance measures were revised so as to consider the supplier as the object of data integration. Consequently, the new SAP optimised the management of information flows through some shared reports that could be easily consulted by all actors involved.

Suppliers were also enrolled in the network. Some meetings between production manager, purchasing managers and the top management fostered the suppliers' involvement in the sharing of performance measures reports. While before the reengineering of the purchasing process the suppliers were not directly involved in the process of performance measurement, which was unsystematic, after the reengineering they were involved in this process in order to both manage the information sharing and

define performance measures that could visualize the critical aspects of the relationship better. Thus, the strategic suppliers were also mobilised, shedding light on some negative results and suggesting some improvements in the performance reports. This way of working changed the modalities of interaction between the manufacturing firm and their suppliers, making them more aware of the results deriving from interfirm relationships, in terms of efficiency and effectiveness.

This redefinition of supplier relationship management modified the way of interfirm interactions and the internal process of both firms. On the one hand, the manufacturing firm after the reengineering process had the possibility of effectively managing the selection process of its suppliers and the connected supplies, avoiding such internal inefficiencies and improving its bargaining power in the negotiation phase. Indeed, the SAP reengineering made it possible to clearly identify, for each step of the purchasing process, what were the performance achieved and who was responsible for it, as well as suggesting how poor results could be improved. On the other hand, the suppliers had the opportunity of actively participating in the definition of performance measures employed to evaluate their supplies, so that they could guarantee a correct measurement of each critical aspect, and select the performance measures that best qualified the supply peculiarities. Likewise,, the supplier took advantage of the information sharing improving their internal process in order to improve the performance of their supplies.

Therefore, the mobilization was characterized by the recognition of SAP innovation as a result of a collective construction able to represent the network of allies holding together the various actors constructed around specific groups of supplies. The case evidence highlights how SAP is a tool for the selection and coordination of interfirm relationships. It frames the supply's characteristics required by the production manager and the conditions upon which the supplies were exchanged, and is an actor within the buyer and supplier relationships.

In this process, inscriptions were crucial for defining what is seen, and for explaining how AIS could both foster action at a distance and give unitary depictions of actors' interpretations of organisational events and features.

5.3 The role of AIS innovation

Through ANT lens, we have shown the translating process of the newly shaped SAP so as to better understand the dynamics which occur among human and non-human actors. In doing so, we have shed light on the role played by SAP as a boundary object.

The new SAP configuration represented a boundary object and more specifically it assumes the features of both the ideal type objects and the standardized forms (Briers and Chua 2001). In fact, it was characterized as hard on the outside and plastic on the inside, in terms of possibilities that actors had to produce and obtain specific information on supplies from the new SAP. They were able to shape the performance reports on the basis of the interorganisational dimensions selected. Thus the new SAP was moulded to suit different interests and requirements. At the same time, the new SAP assumed also the features of the standardized forms, like a software package which acts as a guide for approved action. Following this interpretation, SAP innovation and

the deriving reports of performance measures can be considered as boundary objects that support all actors involved in the purchasing process in presenting their interests and viewpoints. These reports fostered new allies and constructed a new way of interacting among all actors. In this sense, it can be claimed that the SAP innovation, thorough the redefining of the performance measures, contributed to the creation a new space in which actors, internal and external to the purchasing process, have the possibility of collectively constructing new realities.

Looking at the AIS innovation as a translation process, during the interessement phase all actors started to become more conscious about the opportunities offered by the new SAP in sharing systematic information. The introduction of new performance measures led to the visualisation of the profitability of the supplies and their characteristics in terms of cost, revenues and quality through proper reports. In this sense, the new SAP was able to offer a visual performance space (Busco and Quattrone 2014), generating a clear vision of the inter-organisational context .The reengineering process of the supplier selection, through the redefinition of manager's responsibilities, and the new SAP allowed all actors to start thinking how they could contribute to improving the supplier selection exploiting their capabilities.

The case evidence highlights how the performance reports provided by the SAP were introduced to enhance economic reasoning. In this way SAP supported actors in supplier selection and coordination, giving clear instruction about purchasing steps and accumulating additional information in order to enable them to perform the inter-firm relationship.

The new SAP provided also a method of ordering and innovation (Busco and Quattrone 2014) that produced knowledge related to supplies' characteristics and performance. In particular, it did not define what this knowledge should be; instead the new SAP configuration, through the more systematic sharing of information and the possibilities that actors had to mould and shape the supplies report, left its definition to the interplay between the interorganisational practice and users. The spaces in which actors meet were determined by the way supply was organized by purchasing steps. Functional managers and suppliers share all information about supplies' characteristics, quality, delivery time and also the functional manager feedbacks. All the actors become well-informed by sharing SAP reports. The SAP innovation also relied on means of interrogation and mediation (Busco and Quattrone 2014). Specifically, its information content was mediated, renegotiated and reinvented in practice following the peculiarities of the supplies. It helps to easily solve the emerging controversies between the purchasing department and the production manager who had a clear vision of their responsibilities in the purchasing process and were able to produce and share the proper information needed in the negotiation with the suppliers. The production manager and the purchasing department interacted personalising the SAP interfaces in order to underline specific aspects of the supply, which justify its performance. Moreover, the reconfiguration of SAP became the medium through which the target related to each supply and the ways to achieve them were communicated to all actors involved in the purchasing process. All actors also met when the top management organised meeting in order to discuss the potential actions to improve the supply quality. The top management and the functional managers had the opportunity to directly discuss the supply performance with the suppliers involving them in regular meetings.

This involvement fostered a better definition of performance measures that were able to better show the critical aspects of supplies, and simultaneously it encouraged the inter-firm performance information exchange.

Through the new performance reports provided by SAP the innovation came to life, not only thanks to the actors who moulded and shaped it, but also because by participating in the meeting all the actors' interests were mediated.

The composition and the frequency of meetings among functional managers, the top management and the suppliers determined which actors met each other, the time and the place, and gave to all actors the possibility of better control over the purchasing process, in order to improve it through both intrafirm and interfirm cooperation. This affected the course of action, because the composition of these spaces determines who is able to influence the conditions and terms of supplies. However, this did not actually determine a loss of bargaining power for the suppliers. Indeed, after the reengineering of the purchasing process and of SAP they were directly involved in the control process of the manufacturing firm, having also the chance to try such improvements in their internal processes. In this sense SAP acted as an agencement, or a space in which calculative agencies meet. It provided a virtual working space and times where contents and meaning were constructed and negotiated. In this sense, SAP innovation can be seen as an object that activated actors' participation in the practices, providing opportunities to ritually construct and sustain beliefs over time (motivating ritual) to figure out the proper performance measures in the supplier selection process.

6 Conclusion

This study highlights the role of AIS innovation in selecting suppliers. Through ANT lens, we analyzed the translating process of a new AIS stemming from the dynamics occurring between human and non-human actors, and shed light on the role played by the AIS innovation as a boundary object. In the case study the lack of data availability entailed a lack of uniformity in choosing suppliers and meant that the production manager was enrolled in the regular transmission of such data to the purchasing department in order to clarify the product/service characteristics required and to better evaluate the suppliers. For this reason the SAP was rethought helping all the actors involved to visualise suppliers' quality, delivery time and related costs through accounting numbers. The introduction of new calculable space linked together diverse purchasing arenas and levels via SAP. This last became a boundary object which mediated interests of all actors involved solving some controversies which emerged before the reengineering process. SAP innovation allowed accounting abstractions became vital for defining what should be framed and seen. In this view SAP innovation, assuming the features of both ideal type objects and the standardized forms, relied on accounting inscriptions to make transactions visible, define their 'poles', and provide techniques to connect them. SAP optimised the management of information flows through some shared reports that were easily consulted from all functional managers. In addition, the new configuration of SAP shed light on some negative results and suggested some improvements in the performance reports, enrolling the suppliers in the network

We believe that the contributions are the following. First, it helps to contribute to the literature on management control showing how AIS innovation is performed (produced, modified and accepted). In doing so, the case study gives the opportunity of studying different aspects and of putting these in relation to each other, of putting objects in relation with the environment where they operate, offering depth and comprehensiveness for understanding the specific phenomenon and enabling rich, inductive description. As has been shown, all actors involved in supplies aimed to improve revenues, save costs and correctly evaluate supply performance. This was facilitated by the reengineering of the purchasing process that encouraged the actors to collaborate in managing the supplies. In order to understand the peculiarities of AIS innovation and its introduction we drew on Busco and Quattrone's (2014) contribution, this helped us to interpret the SAP innovation as an object and to explore how it performs. In particular, exploring AIS innovation as a space where actors interplay with other accounting tools and technologies shed light on its adoption. In this case SAP innovation provided both new solutions to managerial problems in managing supplies and heterogeneous rationales which characterised the buyer-supplier relationships to justify and legitimise the decisions made.

Second, referring to management accounting literature that has questioned the role of accounting innovation, this study differs from the functionalist and the institutional contributions that have shown how accounting innovation is due to the ability of human actors who rationally recognize it or to the conformity to external factors. Accounting innovation can be implemented in different organizations in different manners, and it makes sense if we interpret it as an actor in a network whereas the different actors take part in this network when their interest emerges and the allies among them become strong through solving the controversies. If the mobilization of all actors' interests is accomplished the innovation has success. Translating the same innovation in other organization contexts could generate an unsuccessful innovation if the process of translation is not completed.

Third, this study contributes to the management control literature giving a sociological explanation of the AIS's active role in the supplier selection as a non human actor. ANT is used as a research method that, focusing on the connections between both human and non-human entities, describes how these connections lead to the creation of new entities that do not necessarily practice the sum of characteristics of constituent entities. In doing so, case evidences highlight how the AIS acts as a boundary object, shedding light on its performativity role. Finally, this contribution can offer to professionals a different perspective in order to analyse inter-organisational problems, to identify the actors involved in finding the common solution given by an AIS innovation.

Several AIS issues are still unexplored in the interfirm field: the shape of the inter-organisational actor-network, the actors' interests and identities mobilized could be analyzed in different forms of organization shedding light on further AIS roles. A point to be investigated can also relate to how AIS can facilitate communication and knowledge integration among partners in inter-firm context. These two aspects could improve the information quality increasing and enforcing the trust among partners.

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