Digital Platorms as Knowledge Artifacts for Clusters of SMEs

Aurelio Ravarini and Luca Cremona

School of Industrial Engineering, Università Carlo Cattaneo – LIUC, C.so Matteotti 22, Castellanza (VA), Italy

Keywords: Cluster of Firms, Digital Platforms, Knowledge Sharing, Knowledge Management Systems, Knowledge Artifacts.

Abstract: Previous studies widely focused on the adoption and usage of Knowledge Management Systems within a single organization or within supply chains providing little explanations of the relations behind knowledge sharing through a digital platform and performances in a cluster of firms. To overcome this void we adopted Knowledge Artifact as a driving concept, and carried out a systematic literature review over 200 articles and identified a theoretical framework that extends the limitations of previous studies basing on three main pillars, then applied this framework on a multiple case study conducted on six SMEs within a cluster of firms in Italy. The results contribute in explaining the variables that influence performance of firms using a digital platform and allow better defining the concept of knowledge artifact according to the situated perspective. *This article has been developed under the DiDIY project funded from the European Union's Horizon 2020 research and innovation programme under grant agreement No 644344.*

1 INTRODUCTION

Contemporary organizations have set the effective use of information and knowledge resources as an important goal to reach. More than ever, they are deriving value from intellectual rather than physical assets and they are benefiting from the most profitable resource: employee knowledge. The identification and exploitation of these resources is becoming central to organizational success (Roberts et al. 2012). Knowledge exists in several locations within an organization, including culturally embedded practices, documents, policies and with individual employees (Grant 1991, Grant 1996, Nonaka and Takeuchi 1995, Cremona et al. 2012). With the growing, strategic, importance of knowledge management more firms are implementing knowledge management systems (KMS): "a class of information systems applied to manage organizational knowledge" (Alavi and Leidner 2001, p. 114). It is relevant not merely to design IT tools to manage knowledge sharing but also to understand how to select and manage knowledge resources. This approach, already critical when dealing with knowledge management in a single firm, becomes a strict requirement within inter-organizational context. Many studies focused on the introduction of KMS within a single firm (Levine and

Prietula, 2011), leaving almost unexplored the issue at the inter-organizational level, with the exception of a particular type of meta-organizations: supply chains. The case of industrial clusters, increasingly claimed as pillars of the several national economies, is marginally studied from the perspective of one of organizational mechanism that enable their success, i.e. knowledge sharing.

To cover this gap, we adopted the concept of Knowledge Artifact and studied the variables affecting the impact of digital platforms on the performances of clusters of firms.

2 THEORETICAL BACKGROUND

2.1 Digital Platforms for Social Networking

In recent years, social networks have become a core topic widely discussed within the Information Systems field. Although mainly born for individuals' socialization purposes, social networks have been at the centre of attention of firms. Several authors discussed the usage and impact of social networks on firms' users and their different types of interactions.

Ellison and Boyd (2013), describe them as "a networked communication platform in which participants 1) have uniquely identifiable profiles that consist of user-supplied content, content provided by other users, and/or system-level data; 2) can publicly articulate connections that can be viewed and transferred by others; and 3) can consume, produce, and/or interact with streams of user-generated content provided by their connections on the site".

Other authors stressed the importance of representing interactions among users using social graphs or activity graphs (Heidemann et al. 2010; Berger et al. 2014). Barabasi et al. (1999) focused on social network theory while Granovetter (1973) and Shi et al. (2014) discussed the concept of "strength of weak ties". Moreover, seminal papers in Information Systems (from here on IS) field (Borgatti et al. 2011) discussed the importance of using methods of social network analysis for mapping relations and influences between actors in a network.

We can observe a growing interest around social networks applications defined as "digital platforms" (from here on DP) for managing knowledge and information sharing. IS scholars have been discussing their benefits on collaboration, communication and knowledge sharing (Majchrzak et al. 2013; Berger et al. 2014; Newell 2014). Muegge (2013) defines such a platform as "a set of technological building blocks and complementary assets that companies and individuals can use and consume to develop complementary products, technologies and services". In a state of the art classification of technological platforms, Gawer & Cusumano (2014) have investigated how digital platforms (they call "externally focused industry platforms") affect innovation.

2.2 Clusters and IS Research

According to Porter (1998): "clusters are geographic concentrations of interconnected companies and institutions in a particular field" (Porter 1998). From an IS point of view, clusters are a kind of inter-organizational entities. IS scholars widely studied inter-organizational information systems (IOIS) dealing with different objects of analysis and underlying theories (Kumar et al 1996; Malhotra et al. 2005; Chi et al. 2008; Romano et al. 2010). Several authors presented the central role of IOIS as the link to other organizations (Kaufman 1966; Barret and Konsynski 1982; Cash 1985; Johnston and Vitale 1988; Meier and Sprague 1991).

Taking into consideration the fields of application, few IS scholars focused on industrial aggregations since Kumar et al. (1998) seminal paper (and his following studies) about clusters. Rather, several studies took place in Business-to-Business (B2B) context, studying the effects of IT on firms performances within supply chains (Chang et al. 2011; Cheng 2011; Venkatesh et al. 2012).

Only relatively recently Pavlou et al. (2010) studied the ability of industrial clusters to enable innovation and competitive advantage by fostering collaboration among firms thanks to a better knowledge and information sharing among users.

Other papers investigate the role of online platforms for enabling SMEs to act jointly on the market for common purposes (Konstadakapulos 2005; Bastías et al. 2014), or study the supplier-customer relationships in a cluster (Kumar et al. 1996; Bakos et al. 2008, Im et al. 2008). Several authors recognize that assessing the value of digital platforms is both important and complex due to the need for analysing the multifaceted relationships (such as competition and co-design besides the default supplier-customer ones) that firms in a cluster face (Yoo et al. 2010; Yoo et al. 2012; Henfridsson et al. 2013).

2.3 Digital Platforms in Clusters of Firms

Recent literature has taken into consideration the DP capability to enable and improve the communication within groups (Mansour 2009), the generation of knowledge (Wasko and Faraj 2005), and the diffusion of information (Singh 2005; Nieves and Osorio 2013). Murphy and Salomone (2013) studied the usage of social media technologies applied for enabling knowledge transfer and "optimizing the management of tacit engineering knowledge". Previous studies mainly focused on the inherence processes of knowledge sharing and management by digital platforms, yet rarely speculated upon the objective and consequences of such processes.

In synthesis, the role of DP as an enabler of knowledge sharing in an IOIS has been studied, but a) mainly in supply-chain contexts (based on "vertical" supplier-customer relationships) rather then in clusters, characterized by peer-to-peer interactions; b) with a limited understanding of the role that the DP can actually play in favour of the cluster.

Our paper stands out of this previous literature in the attempt to overcome these research gaps. To such aim, we introduce the concept of Knowledge Artifact.

2.4 Knowledge Artifact Definitions

According to Cabitza and Locoro (2014) a Knowledge Artifact can be described following two different approaches: a representational approach and a situational approach. The first one sees knowledge as an entity: a KA is a representation of certain amount of information that is inextricably related (on the physical side) to the physical supports (paper, hard disks, KMS) through which it is memorized and managed, and (on the abstract side) to its semantics and possibly its ontology.

The situated perspective – on the contrary – sees knowledge related to processes such as innovation, decision making and learning. A KA "cannot be decoupled, nor generalized, from the specific setting or Community of Practice, or from the boundary between communities where the KA is supposed to play its role of knowledge facilitator and transfer medium." (Cabitza Locoro 2014).

The aim of this study is to exploit "knowledge artifact" as a reference concept to describe the enabling role of a DP as a tool for knowledge sharing in a cluster, and understand what are the properties that can make it relevant for the business value.

2.5 Knowledge Sharing

Knowledge sharing can be studied from two main perspectives: strategic and organizational. A preliminary literature review showed as reference topics for these two perspectives - respectively - "joint activities" and "knowledge management systems". Given the interest to understand the effect of DPs on the value of the cluster, a third topic of interest was identified in the IS literature of "business value of IT". On these three topics we performed a systematic literature review (Okoli and Schabram 2010), querying the JSTOR database for papers from 1990 to 2012. 110 papers with full text were identified and their references were retrieved and selected. As a result, 60 articles were reviewed in detail, allowing to draw a picture of the state-of-the-art of the literature on the three topics, reported in the following.

Joint activities are activities performed between different organizations involved in alliances or collaborating jointly on the market (Kent, 1991). Past studies mostly focused on the creation of alliances (Richardson 1972, Porter and Fuller 1986, Gulati 1998, Siggelkow and Levinthal 2003, Beckman et al. 2004, Oxley and Sampson 2004, Lavie and Rosenkopf 2006). These studies do not explicate which kind of activity, if performed jointly, leads to a

better competitive position on the market. Moreover, this literature mostly focused on strategic issues doesn't take into account the role of IT (i.e. digital platforms) as potential enabler of new joint activities between firms.

KMSs are information technology-based systems coupled with knowledge-sharing practices that support knowledge management efforts within an organization (Alavi and Leidner 2001). In the past, studies mostly focused on the adoption and usage of KMS within single firms (Gold et al. 2001, Schultze and Leidner 2002, Eisenhardt and Santos 2002, Kim and Lee 2006, Ko and Dennis 2007). These studies described the mechanisms that facilitate and inhibit the knowledge and information exchange limitedly to an intra-organizational level, while our paper investigates the effects of knowledge sharing through a digital platform in an inter-organizational context, a cluster of firms.

Business value of IT refers to the impact of IT on organizational performance measures such as productivity enhancement, profitability improvement, cost reduction, competitive advantage, inventory reduction (Devaraj and Kohli, 2003). Past studies mostly focused on the effect on firms' performances provided by specific IT tools – such as ERP systems – both at the intra-organizational level and within supply-chains (Bharadwaj 2000, Ray et al. 2005, Chang et al. 2009, Yoo et al. 2010, Sarker et al. 2012, Resca et al. 2013). To our knowledge, no previous attempt has been done to study the business value of IT of a digital platform in a cluster of firms.

2.6 Research Framework

Despite the research gaps identified for each of the three topics studied, the systematic literature review allowed to recognize a limited set of papers (Malhotra et al. 2005, Dong et al. 2009, Reagans et al. 2003, Nieves et al. 2013) that proved closer to the aims of our work and they were taken as a point of reference for the research. These papers allowed to create a theoretical framework, based on three variables that influence the performance of the cluster:

- the capabilities of the DP, i.e. a set of factors (the presence of a social network between firms, IT managerial skills, capabilities of the IT system) influencing the IT business value of the DP;

- the strength of interpersonal connections among the entrepreneurs of the firms of the cluster;

- the joint activities between firms.

Figure 1. The constructs of the theoretical framework.

3 METHODOLOGY

A multiple-case study methodology (Stake 2006, Yin 2003) together with a positivist approach (Benbasat et al. 1987) was chosen for exploring our theoretical framework on knowledge management systems within a cluster of firms. A qualitative method was adopted both to explore the factors that facilitate the usage of a digital platform by firms in the same cluster and to understand how the information exchange is influenced and which are the effects on performance of each firm. A team of a junior researcher, a senior researcher and a professor collected all the data and analysed them: this approach was helpful in capturing greater findings and maximizing reliability. Following Yin (2003) a case-study protocol was designed including the following sections: overview of the project (objectives and issues), field procedures, questions, and guidance for the report.

3.1 The Digital Platform of the Study

During the first half of 2012, 27 firms of the Energy Cluster (a cluster of SMEs located in the Lombardy Region in Italy, specialized in services and products supply for the production of electricity) started a project to develop a Digital Platform with the purpose of improving internationalization. The DP has the typical features of a social networking platform (e.g. company profile pages, online walls to publish posts, online thematic groups with limited access). The users of the DP (typically CEOs, entrepreneurs, operations, sales or marketing managers) have access to a unique information system, shared among the firms of the cluster, to collaborate, design and improve their internationalization by developing joint activities to enable the entrance in new markets, by implementing shared procedures for the management of joint supplies, by using shared tools to manage firms' and cluster's activities.

During 2014, the cluster achieved several objectives. First, all the communications about internationalization have been aggregated and distributed through the DP, a unique source of communication, rather than flowing through different ungoverned channels (eg. emails, newsletters, meetings). Second, every firm has an account for the platform and a profile page describing in detail competences and products. Third, the number of firms has increased from 27 to all firms inside the cluster (almost 100). These result were made possible thanks to a systematic community management strategy: story telling about events, trade fairs and events promoted within the Energy Cluster territory.

3.2 Data Collection and Analysis

As suggested by Yin (2003) we followed a multiple informants design by identifying 6 firms to be investigated and involving key employees. A questionnaire was developed basing on the theoretical framework (Figure 1) and was used to carry out interviews in each firm to the CEO or its representative a/o the marketing and sales manager. To get a higher data reliability the interviews were carried out in two different timings: at the beginning of the project and after one year the firms were using the platform. Together with the interviews, in order to increase the validity of our coding and data analysis procedure, we aggregated multiple sources of evidence (Yin 2003): artefacts (i.e. extracts from the platform), documents from each firm (about performances and financial situations) and information from websites. Cases, were chosen for enabling theoretical and literal replications (Yin 2003): at least two firms with relatively high involvement in the project, and two firms with relatively low involvement in the project.

All interviews were tape-recorded and transcribed: the transcripts from the 17 interviews were aggregated into a case protocol helping the researchers in organizing data. The projects were encoded and structured using the software NVivo 10 following a grounded theory approach (Strauss 1987, Glaser 1992).

4 RESULTS

The following paragraphs present the most relevant results for each element of the framework and try to categorize different uses of the platform.

4.1 Capabilities of the Digital Platform

The community of the cluster showed a high, though decreasing along time, resistance to the usage of the DP. Maybe this is due due to the average perception of the role of IT: some firms look at IT as a tool to get better control of the business (Firm 2, Firm 3, Firm 4, Firm 6); others look at IT as a tool to substitute humans labour and, therefore, to reduce costs (Firm 1 and Firm 5). Surprisingly, almost each firm did not have a formal and structured IT development plan.

Despite this initial resistance, firms started using the DP, but not before a transitory phase of limited usage, considered necessary by each firm to understand the dynamics of interaction within the online community and to quit doubts about the risk of loosing their own competitiveness because of exchange of critical information.

With regards to information exchange the DP is effective: firms on line interaction is based on natural language, with no need to translate data shared in the DP. Moreover, firms recognize the coherence between the knowledge shared inside the cluster (mainly referred to products and services) and the one available through the DP.

4.2 Joint Activities

Traditionally, firms in the cluster have been acting as single players: joint activities are seen with diffidence and the cluster is seen as a context with the opportunity to meet potential customers and suppliers, but also competitors. "…from our point of view, within the Energy Cluster since there are not suppliers, the only collaboration was with customers…" (Head of Special Projects, Firm 1). "…participating in the cluster means…we think it is useful, we still need to know the best interaction possible. The interaction with competitors is always difficult to manage but inside the Energy Cluster we have suppliers too…" (Marketing Manager, Firm 2). This negative attitude smoothly decreased in parallel with the increase of usage of DP, generating a virtuous circle towards joint activities.

4.3 Strength of Interpersonal Connections

The usage of the DP reinforced the strength of the interpersonal connections existing between the entrepreneurs by raising the frequency of their social and business meetings. Each firm is aware of the activities and products made by other firms of this research. This is happening even if they did not experience any joint activity before. More, we investigated if each manager interviews had specific connections out of the workplace. What is emerging from this analysis is that firms have average knowledge of each other. Firm 5 only is the most isolated among them; this is partly due to its peculiar activities within the Energy Cluster.

4.4 Performance of the Firms

Firs recognize a positive impact of the DP on the internal operational efficiency. The DP is considered as a tool that could boost the growth in new markets thus overcoming the traditional focusing of SMEs on production and cost reduction. Moreover, the DP positively influenced the selection of new suppliers and vendors proving to be an effective marketplace for new products and services promotions. With respect to the aim of internationalization of the cluster, the firms using the digital platform recognized to gain benefits from a better understanding of new and emerging markets thanks to the knowledge shared through DP by other firms operating in such markets.

5 FINDINGS, LIMITATIONS AND FUTURE RESEARCH

Results of this multiple-case study showed how the usage of a digital platform contributed to reinforce connections between the firms. Knowledge sharing within the cluster was enhanced by mechanism of information and knowledge filtering and selection that positively impacted on competitive advantage. The determining factor in the success of an inter-organizational digital platform, such as the one presented within this paper, is not related to its potential of generating competitive advantage only, but it is strongly related to its long-term sustainability. The core factor is the awareness of the power to generate knowledge sharing from and within the digital platform itself, thus producing benefits hard to replicate in the long term.

From the point of view of the KA, the study shows that the DP in cluster of firms can be considered an emblematic case of the situated perspective. The knowledge shared through the online platform is strongly intertwined with the specific characteristics of the firms, or better, the employees using the DP. In fact, the evolution in their approach to the DP determined an increased effectiveness of the KA as a whole.

Moreover, we believe that the three identified constructs composing the research framework (IT capabilities, joint activities, strength of interpersonal connections) are candidate variables that could be used to better describe and possibly qualify a KA according to the situated perspective. Limitations from previous studies (e.g. Cabitza & Locoro 2014) regarding the interconnections between the business value and KA were investigated. This research extended previous studies by verifying that KA is affecting the business value of firms, enforcing interpersonal connection and enabling joint activities.

This study has some limitations. Firstly, we studied a sample of 6 firms among the 28 pool of firms using the DP. Secondly, the research considered only a specific cluster. Further research will aim at either studying larger samples of firms in order to increase generality and generalizability of the current findings, or applying the same study to different clusters in different countries, to check if the cultural environment could lead to different results.

REFERENCES

Alavi M., Leidner D. E., "Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues", MIS Quarterly, 25 (1), 2001.

Bharadwaj A.S., "A resource-based perspective on information technology capability and firm performance: an empirical investigation", MIS Quarterly, 24 (1), 2000, pp. 169-196.

Beckman C. M., Haunschild P. R., Philips D. J. "Friends or Strangers? Firm specific uncertainty, Market uncertainty and Network partner selection", Organization Science, 15 (3), 2004, pp. 259-275.

Benbasat I., Goldstein D.K., Mead M., "The Case Research Strategy in Studies of Information Systems", MIS Quarterly, 11 (3) 1987, pp. 369-386.

Burt R. S., "The contingent value of social capital", Administrative Science Quarterly, 42, 1997, pp. 339-365.

Cabitza, F., & Locoro, A. "Made with Knowledge": Disentangling the IT Knowledge Artifact by a Qualitative Literature review", KMIS 2014, Rome, Oct. 2014.

Chang H. L., Shaw M. J., "The Business Value of Process Sharing in Supply Chains: A Study of RosettaNet", International Journal of Electronic Commerce, 14 (1), 2009, pp. 115-146.

Cohen W. M., Levinthal D. A., "Absorptive capacity: A new perspective on learning and innovation", Administrative Science Quarterly, 35 (1), 1990, pp. 128-152.

Cremona L., Ravarini A., "Collective Intelligence and Social Computing: A literature review", Information

systems: crossroads for organization, management, accounting and engineering: ItAIS: the Italian Association for Information Systems. - Heidelberg [u.a.]: Physica-Verl, 2012, p. 35-41.

Devaraj S., Kohli R., "Performance Impacts of Information Technology: Is Actual Usage the Missing Link", Management Science, 49 (3), 2003, pp. 273-289.

Dong S., Xu S., Zhu K., "Information technology in supply chains: the value of IT-enabled resources under competition", Information systems research, 20 (1), 2009, pp. 18-32.

Dubé L., Paré G., "Rigor in Information Systems Positivist Case Research: Current Practices, Trends, and Recommendations", MIS Quarterly, 27 (4), 2003, pp. 597-636.

Eisenhardt K., Santos F. "Knowledge-Based View: A New Theory of Strategy?", 2002, Chapter 7 in (eds.) Pettigrew A., Thomas H., and Whittington R., Handbook of Strategy and Management, Sage Publications.

Glaser B., "Basics of grounded theory analysis", 1992, Mill Valley, CA: Sociology Press.

Gold A.H., Malhotra A., Segars A.H, "Knowledge management: an organizational capabilities perspective", Journal of Management Information Systems, 18, 2001, pp. 185-241.

Grant R.M., "The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation", California Management Review, 33 (3), 1991, pp. 114–135.

Grant R.M., "Toward a Knowledge-Based Theory of the Firm," Strategic Management Journal (17), Winter Special Issue, 1996, pp. 109-122.

Gulati R., Singh H., "The Architecture of Cooperation: Managing Coordination Costs and Appropriation Concerns in Strategic Alliances", Administrative Science Quarterly, 43 (4), 1998, pp. 781-814.

Heidemann, J., Klier M., Probst F., "Online social networks: A survey of a global phenomenon", Computer Networks, 56 (18), 2012, pp.3866-3878.

Hofstede G., "Culture's Consequences: International differences in work related values", Beverly Hill, CA, Sage, 1980.

Holsti O.R., "Content analysis for the social sciences and humanities", Addison-Wesley, Reading, Mass., 1969.

Inkpen A. C., Dinur A., "Knowledge management processes and international joint ventures", Organizations Science, 9 (4), 1998, pp. 454-468.

Kaufman F., "Data Systems That Cross Company Boundaries. Harvard Business Review", 44 (1), 1966, pp. 141-155.

Kent D. H., "Joint ventures vs. Non-joint ventures: An empirical investigation", Strategic Management Journal, 12 (5), 1991, pp. 387-393.

Konstadakopulos, D., "From public loudspeakers to the Internet: The adoption of infor-mation and communication technologies (ICTs) by small-enterprise clusters in Vietnam", Information

Technologies and International Development, 2 (4), 2005, pp. 21-39.

Koza M. P., Lewin A. Y., "The Coevolution of Network Alliances: A Longitudinal Analysis of an International Professional Service Network", Organization Science, Focused Issue: Coevolution of Strategy and New Organizational Forms, 10 (5), 1999, pp. 638-653.

Kumar K., Van Dissel H. G., "Sustainable collaboration: managing conflict and co-operation in interorganizational systems", MIS Quarterly, 1996, pp-279-300.

Lavie D., Rosenkopf L., "Balancing Exploration and Exploitation in Alliance Formation", Academy of Management, 49 (4), 2006, pp. 797-818.

Levine S., Prietula M., "How Knowledge Transfer Impacts Performance: A Multi-Level Model of Benefits and Liabilities", Organization Science, 23(6), 2011, pp. 1748-1766.

Majchrzak, A., Faraj S., Kane G. C., Azad, B., "The contradictory influence of social media affordances on online communal knowledge sharing", Journal of Computer- Mediated Communication, 19.(1), 2013, pp. 38-55.

Malhotra A., Gosain S., El Sawy O. "Absorptive capacity configurations in supply chains: gearing for partner-enabled market knowledge creation" MIS Quarterly, 29 (1), Special Issue on Information Technologies and Management, 2005, pp. 145-187.

Mansour O., "Group Intelligence: A Distributed Cognition Perspective. In: Intelligent Networking and Collaborative Systems", INCOS '09, 2009, pp. 247-250.

Mukhopadhyay T., Kekre S., Kalathur S., "Business Value of Information Technology: A Study of Electronic Data Interchange", MIS Quarterly, 19 (2), 1995, pp. 137-156.

Nieves J., Osorio J., "The role of social networks in knowledge creation", Knowledge Management Research & Practice, 11, 2013, pp. 62–77.

Nonaka I., Takeuchi H., "The Knowledge-Creating Company: How Japanese Firms Create the Dynamics of Innovation", New York: Oxford University Press, 1995.

Okoli C., Schabram K., "A Guide to Conducting a Systematic Literature Review of Information Systems Research", Sprouts: Working Papers on Information Systems, 10 (26), 2010.

Oxley J.E., Sampson R.C., "The Scope and Governance of International R&D Alliances", Strategic Management Journal, 25 (8/9), 2004, pp. 723-749.

Porter M., Fuller M. B., "Coalitions and global strategy", Competition in Global Industries, Harvard Business School Press, 1986, pp. 315-343.

Quinn Patton M., "Qualitative Reseach & Evaluation Methods", Sage Publications, Thousands Oaks et al., 2002.

Ray G., Muhanna W. A, Barney J. B, "Information Technology and the Performance of the Customer Service Process: A Resource-Based Analysis", MIS Quarterly, 29(4), 2005.

Reagans R., McEvily B., "Network structure and knowledge transfer: the effects of cohesion and range", Administrative Science Quarterly, 48, 2003, pp. 240-267.

Resca A., Za S., Spagnoletti P., "Digital Platforms as Sources for Organizational and Strategic Transformation: A Case Study of the Midblue Project", JTAER, 8 (2), 2013, pp. 71-84.

Richardson G.B., "The organisation of industry", The Economic Journal, 1972, (Republished in Richardson 1990 and Richardson 1998).

Roberts R., Grover V., "Leveraging Information Technology Infrastructure to Facilitate a Firm's Customer Agility and Competitive Activity: An Empirical Investigation", Journal of Management Information Systems, 28 (4), 2012, pp. 231-270.

Sarker S., Sarker S., Sahaym A., Bjørn-Andersen N., "Exploring value cocreation in relationships between an ERP vendor and its partners: a revelatory case study", MIS Quarterly, 36 (1), 2012, pp. 317-338.

Schultze U., Leidner D., "Studying knowledge management in information systems research: discourses and theoretical assumptions", MIS Quarterly, 26 (3), 2002, pp.212–242.

Shanley M., Peteraf M., "Vertical group formation: A social process perspective", Managerial and Decision Economics, 25 (6-7), 2004, pp. 473-488.

Siggelkow N., Levinthal D. A., "Temporarily Divide to Conquer: Centralized, Decentralized, and Reintegrated Organizational Approaches to Exploration and Adaptation", Organization Science, 14, 2003, pp. 650-669.

Stake R. E., "Multiple case study analysis", New York: Guilford 2006.

Strauss A., "Qualitative analysis for social scientists", Cambridge, 1987, England: Cambridge University Press.

Wasko M. M., Faraj S., "Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice", MIS Quarterly, 29(1), 2005, pp. 35-57.

Williamson O. E., "The economic institutions of capitalism: Firms, markets, relational contracting", New York. Free press. 1985.

Yin R. K., "Case Study Research: Design and Methods", Thousand Oaks, CA, Sage Publications, 2003.

Yoo Y., Henfridsson O., Lyytinen K., "Research commentary-The new organizing logic of digital innovation: An agenda for information systems research", Information Systems Research, 21 (4), 2010, pp. 724-735.

Zhu K., Kramer K. L., Gurbaxani V., Xin Xu S., "Migration to Open-Standard Interorganizational Systems: Network Effects, Switching Costs, and Path Dependency". MIS Quarterly, Special Issues on Standard Making, 30, 2006b, pp. 515-539.