Divergent Roles of Collective Action in Software Business

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Abstract

The purpose of this study is to explore the role of collective (non-economic) action as part of for-profit software business models in different value systems. Particularly, the study focuses on voluntary non-economic exchange between various actors with shared intentions in different business settings. This kind of collaboration based on shared intentions is regarded as strategic networks in the industrial network approach (INA). Therefore, in addition to a review of earlier literature on collective action, we draw on the discussion on strategic networks to establish a conceptual framework for distinguishing between different roles of collective action networks. In the empirical part of the study we analyze the types and roles of identified intentional collective action networks in software business through a comparative study of five cases. Our empirical findings indicate that the roles and characteristics of collective action vary systematically between different types of value systems. We recognize that collective (non-economic) exchange embodies different purposes in for-profit businesses and possesses roles that include supporting existing business, facilitating incremental development of current business, and enabling the development of new business models of software companies.

Keywords: Collective action, strategic networks, value systems, business models, non-economic exchange

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Introduction

Industrial networks have received considerable attention in the research literature (Håkansson 1982, Mattsson 1987, Axelsson and Easton 1992, Wilkinson and Young 1994, Håkansson and Snehota 1995, Ford et al. 1998, Möller and Halinen 1999). This is natural, especially due to that networks imply numerous dualities that offer interesting tensions for research. Traditionally, the economic exchange relationships based on direct profit aspirations have dominated the theoretical and empirical studies on industrial networks (Easton and Araujo 1992). Recent evolution in strategic networking incorporates, however, an emerging phenomenon, in which various for-profit actors are engaged in non-economic exchange relationships as part of their business models. Purposeful collective action based on non-economic exchange as part of software companies' businesses has created new organizational forms and business models, and has gained publicity especially along with the increase of open source software activity. This kind of network activity provides novel opportunities for small companies in local economies to expand their business to global markets. Prominent examples of this phenomenon include, e.g. development and distribution of originally Finnish-based Linux and MySQL software solutions through collective action within the open source community. Other interesting examples include international new product development (NPD) networks and national standardization approaches by organizations and companies engaged in the emerging business related to e.g. electronic invoicing. In addition, collaboration between small enterprises, media companies, industry associations and universities in technology foresight provides a good example of collective action based on non-economic exchange, including collaboration that is not guided by direct profit aspirations.

Brito (2001) illustrates that collective action has an impact on the shape of industrial networks. However, the role of collective action based on non-economic exchange has not received sufficient attention in the existing research literature. Need for this kind of research is identified, e.g. by Oliver (1993), who calls for more research on the conditions under which collective action is rational, and, for identifying what are the important types of collective action. On one hand, the recent literature identifies non-economic relationships mainly as inter-competitor relationships or relationships with public organizations, such as universities, different professional associations and government (Easton and Araujo, 1992). On the other hand, there is an existing body of research on non-economic co-operation in the field of social networks based on relationships between individuals (Castells 1996, Burt 1992, Adler and Kwon 2002). In this study, we go beyond the traditional industrial network approach through applying the perspective of collective action in exploring non-economic exchange relationships in business networks.

In contrast to earlier research perspectives on networks with non-economic intentions, which has mainly concerned social networks, this study considers collective action networks characterized by non-economic exchange, in which some or all of the actors are profit-seeking business actors. Some actors in these networks may, however, be individuals. The objective of this study is to analyze the characteristics and roles of purposeful collective action networks as a part of software companies' for-profit business. Our study focuses on the role of collective action in software business models, which is analyzed in the focal firm level. Therefore, we explore collective action networks based on non-economic exchange relationships in different software businesses through the following research questions:

(1) *What kinds of collective action networks exist in the business of software companies?*

and

(2) *What are the roles of identified collective action networks for the business of a software company?*

This study is divided into three main sections. First, after the brief introduction to the study and research methodology, we review the theoretical foundations of collective action based on the literature and present our research framework. Then, we describe our empirical findings of identified

collective action networks as part of selected software businesses. Finally, we discuss our findings and draw conclusions on the roles of collective action networks in different value systems.

The concept of strategic networks

During the last two decades there has been substantial body of research on business networks (Gadde and Mattsson 1987, Håkansson and Johansson 1993, Anderson et al. 1994, Håkansson and Snehota 1995, Iacobucci 1996, Ford et al. 1998, Möller and Halinen 1999, Ford 2002, Holmen and Pedersen 2002). Studies on industrial networks acknowledge that a firm is embedded in a network of ongoing business and non-business relationships, which both enable and constrain its performance (Håkansson and Ford 2002, Ritter et al. 2004). Klint and Sjöberg (2003) divide networks into two distinct categories. Organic networks compound of traditional buyer-seller activities resulted in a relationship and a sense of closeness between the actors. The organic network is unplanned and there is no request for a common goal. Strategic networks (Jarillo 1988, Gulati et al. 2000, Möller et al 2005), in turn, are deliberately created, organized cooperation between companies, with the purpose to achieve a common objective. In addition, strategic networks have common goals and actors are known to each other.

Strategic networks have received increasing attention in the literature on industrial network approach (INA) as an important perspective to interorganizational exchange (Jarillo 1988, Dyusters et al. 1999, Gulati et al 2000, Barabasi 2002, Möller et al. 2005). Ojasalo (2004) identifies that motives for acting in strategic networks are related to dimensions such as positive cash flow generation, information, reference value, security, new competences, and new business opportunities. He also points out that since business network is a structure with inherent dynamic features, the goal set by the focal firm, the extent of goal congruence of actors, and the power positions of actors are likely to change over time in key network. A single member that enters, positions, repositions, or exits from the network causes changes to the entire network (Thorelli 1986). Johansson and Mattsson (1992) point out that the position of an actor is described by the characteristics of its exchange relationships. Business relationships may be formed with any of the types of actors depicted in the value creation, and the range of relationships a firm participates in represents its relationship portfolio. For example, Möller and Halinen (1999) and Möller et al. (2005) emphasize that coping in networks incorporates several levels of network management issues with various interconnected key themes.

In this study we focus on an instance of strategic networks that has received less attention in the literature. There are relatively few studies focused on non-economic exchange relationships, although multiple studies call for the discussion on the topic (Araujo and Brito 1998, Brito 2001). Therefore, in this study, we make an attempt to explore non-economic exchange relationships in business networks by extending the industrial network approach through the perspective of collective action. Brito (2001) argues that the existence of collective actors and the relationships established around them introduce a new relational dimension to the traditional network approach model. We contribute to this field by analyzing the roles of collective activity exhibiting non-economic exchange in strategic networks. In this study we use the value system continuum (Möller et al. 2005) based on the value-creating system concept described by Porter (1990), Håkansson and Snehota (1995) and Parolini (1999), and the discussion of strategic networks (Möller et al. 2005) to construct a research framework to structure our analysis of the roles of collective action networks in different value systems.

We see that collective action based on non-economic exchange may appear in one or many strategic networks within a value system. These kinds of networks may appear to a large degree in emerging value systems, in which value production architecture is unestablished or meets radical changes. Also, they may exist in stable-well defined value systems in an institutionalized form of a collective actor, formed by a network of actors. However, Brito (2001) argues that collective actors may not survive for long periods of time, especially if they have an informal nature. He continues that priorities and circumstances change and collective actors that do not fulfill early promises cannot hope to survive for long. Furthermore, Brito (2001) points out that cooperation, assuming the form of a non-economic exchange, tends to play a key role in shaping the “rules of the game” and the structure of the network. This dynamics shapes networks based as well on economic as on non-economic exchange, and include incentives that motivate even for-profit actors to engage in non-economic exchange relationships.

Collective Action in Software Business

Theories of collective action have been of interest to both economists and sociologists. However, research on collective action has not reached a consensus on one general theory of collective action, rather a number of models and concepts. Heckathorn (1996) identifies three mechanisms that underlie collective action – voluntary cooperation, strategic interaction, and selective incentives. A number of researchers (e.g. Olson 1965, Mueller 1989:11, Oliver 1993, Udéhn 1993, Harrison and Easton 2002) argue that collective action systems involve some form of collective (public or semipublic) good. According to Olson (1965), Udéhn (1993) and Monge et al. (1998), these goods offer participants in networks collective benefits that are (a) nonexcludable, in that they are available to all network partners, and, (b) jointly supplied, in that partners' uses of the good are noncompeting.

Formal collective action theories have undergone an enormous growth and elaboration within recent years, with a major shift from focusing on individual decisions and operation to focusing on group structures and interaction. Hence, the current definitional core of collective action lies in the shared inter-organizational interests and relationships, and theories of strategic networks have emerged as increasingly eligible perspective to this phenomenon.

Udéhn (1993) argues that since the seminal work by Olson (1965), the network theories have brought very little new to the discussion of collective action. However, Araujo and Brito (1998) have criticized that the framework presented by Olson (1965) fails to explain institutionalized forms of collective action, as well as the nature and scope of incentives for joint collective action. In addition to this, Araujo and Brito (1998) point out, that collective actors consist of a group or network of actors, and may or may not adopt formalized structures, e.g. through the use of contracts. Thus, interorganizational networks bring new aspects to the discussion of collective action. They include both institutionalized forms of collective action; as well as informal issue-based nets that aggregate and mobilize shared interests. Brito (2001) shows that the phenomenon of collective action and the institutional dimension of relationships extend the scope of managerial action through set of challenges. Harrison and Easton (2002) address this same issue and depict these challenges in terms of creating and managing new forms of collective action where the main problem lies in the co-ordination within and between the firms.

Wilson (1973) argues that there are three types of rewards for firms acting collectively. These are material (economic), solidary (social), and purposive (political) in nature. Already Olson (1965) identifies that one motive for collective action is cost sharing, which is, of course, fundamentally related to economic incentives. Olson, however, was skeptical about its effectiveness in large groups and pointed out the "free-rider problem" in collective action. His arguments have stimulated a broad discussion in the literature (e.g. Oliver 1993, Udéhn 1993, Heckathorn 1996, Brito 2001). In accordance with Wilson's (*ibid*) view on rewards, Araujo and Brito (1998) point out that networks include economic, political and social exchange. Udéhn (1993) and Harrison and Easton (2002) emphasize, that social networks in collective action are sometimes crucial in order to understand and explain the phenomena even in the context of industrial networks. However, when political or social exchange occurs, the costs and benefits of collective action are difficult to measure.

Udéhn (1993) emphasizes that explaining collective action also requires considering non-economic motives. In addition, Araujo and Brito (1998) claim that networks, in which economic exchange is embedded, may execute collective action in order to produce political exchange. Thus, actors trade resources with the aim of manipulating to their advantage the rules that structure economic exchange. Brito (2001) addresses these same issues by pointing out that industrial networks include simultaneously formal types of collaborative arrangements, and on the other hand, they emphasize the importance of informal and emergent forms of cooperation. Industrial networks are characterized by stable, long-term links, as well as lively, dynamically changing relationships. Indeed, according to Brito (2001), change is a key feature of any industrial network. Lundgren (1992) addresses an important contribution to this issue by contending that change takes both continuous and discontinuous forms in industrial networks. Also, industrial networks include cooperation based not only on economic exchange, but also on non-economic incentives, such as social status or other political benefits that are important drivers in the dynamics and nature of networks (Udéhn 1993, Heckathorn 1996, Araujo and Brito 1998, Brito 2001, Harrison and Easton 2002).

Based on these theoretical perspectives, we define collective action networks as intentional collaboration of actors joined together to create value without economic exchange. The actors in these networks can be either for-profit or non-profit business actors or individuals that form a network with not-for-profit intentions to accomplish mutual benefits. Thus, we consider collective action as embedded activity within industrial networks that are generally guided by profit intentions. Individual actors in these networks may or may not have direct or indirect individual profit motives for the collaboration. This is consistent with the arguments presented by e.g. Brito (2001), who points out that collective action interests may be influenced by economic reasons, which are, however, not a prerequisite for acting collectively.

Research Framework

The value-creating system concept described by Parolini (1999), and based on Porter (1990), identifies the value system as a construct that describes the combination of actors and their value creating activities in a given business in aggregate. We apply this concept as a basis of our research framework and share the view of Normann and Ramirez (1993) and Cravens et al. (1997) who define value system as a combination of the value activities of multiple actors that create value propositions for end customers. We also share the view of Möller et al. (2005) according to which value systems include different strategic nets aiming at particular goals through a set value activities. We use the value system concept to describe business as a whole that include strategic networks, some of which are based on collective action without direct profit aspirations.

In order to identify the roles of collective action networks in value creation, we apply the value system continuum proposed by Möller and Svahn (2003) and Möller et al. (2005). This framework aids to distinguish between different kinds of business settings with the emphasis on strategic networks. In other studies (e.g. Svahn 2004, Möller et al. 2005), the conceptual value system continuum has been found a feasible tool for characterizing different types of businesses with the emphasis on value-creating networks. We suggest that the purposes and roles of collective action networks vary systematically between different kinds of value systems.

In our initial framework we consider collective action as part of the value system at the level of an actor's business model. The role of collective action is identified from a focal actor's perspective. The focal actors selected as the focus of this study are software companies that have identifiable participation in collective action networks. Figure 1 illustrates the three different types of value systems as the basis for exploring collective action networks within them.

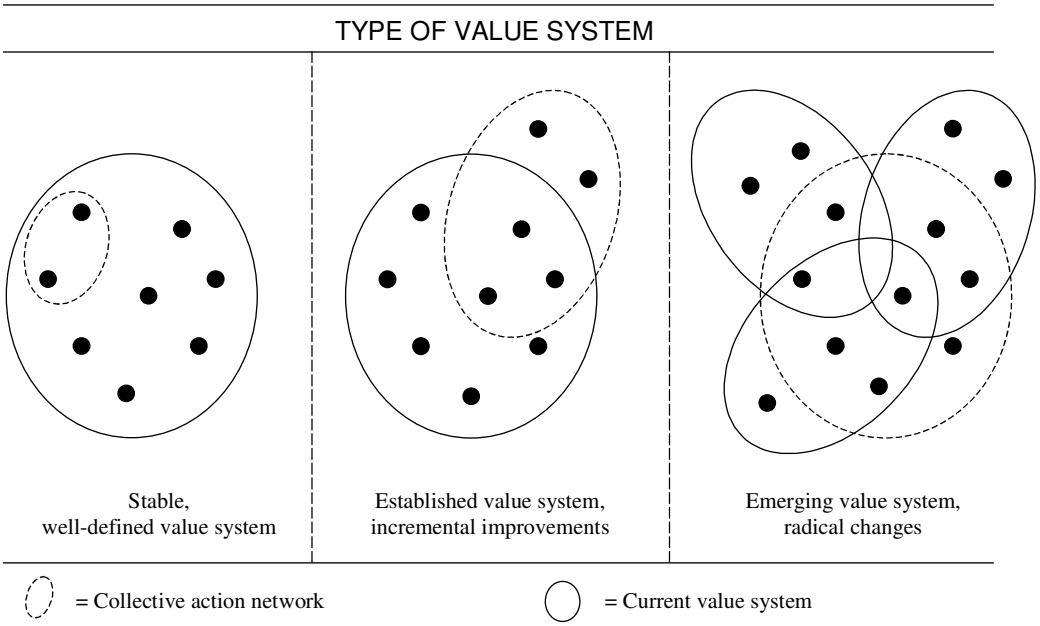

Figure 1 Value system classification as the context for collective action networks

In the framework we depict three different ideal types of value system as identified by Svahn (2004) and Möller et al. (2005), who use the value system concept for describing the characteristics of

business nets. They argue that the level of determination of value activities in a value system, and the goal of a net have a strong influence on both how to organize the net and how to manage it. Thus, the basic dimensions of the value system continuum describe the level of determination of the value systems and the goals of the nets. Based on the value system continuum presented in these prior studies, the left end in our Figure 1 represents clearly specified and relatively stable systems in which the actors produce and deliver specific products and the value activities are well known. The middle section of the figure represents value systems that are relatively well determined, but are being modified through incremental and local improvements. The right end of the figure represents emerging value systems that are future-oriented and involve radical changes in the value activities, as well as aim at developing new technologies, products or business concepts.

The figure presents collective action networks in connection with different types of value systems. We see that the type and role of collective action relate to and differs systematically by the specific characteristics of each value system. The black dots in the figure represent actors in the value system. The dotted ellipses in the figure represent collective action as part of different types of value systems. It should be noted that due to the nature of exchange in collective action, some of the actors might become part of the value system through participating in collective action. In accordance with the prior literature, e.g. Brito (2001), we assume that the relative proportion of collective action varies in different value systems.

Research Design and Methodology

In this paper, we analyze intentional collective action as part of the value-creating networks in different software businesses. Software business is selected as the focus of this study, because it embodies novel instances of collective action networks that have not yet received attention in the research literature. Our primary goal is to analyze the role of collective action in different software businesses through case studies. We take a qualitative research approach for the collection and analysis of primary data in a multiple case study setting. We explore collective action networks in five cases in which we have identified purposeful non-economic exchange relationships. In addition, we analyze the role and characteristics of the identified collective action networks in each of the cases. To structure the analysis of our empirical data, we apply a framework based on the value system continuum of Möller et al. (2005).

The primary data is collected from five case companies during a three-year period in 2003-2005. We conducted a total of seven semi-structured and open-ended interviews with senior management in the selected case companies. These companies are located in Finland and can be classified as small and medium-sized enterprises in an international scale. In addition, they represent heterogeneous business models in the software industry. The interviews focused on getting to the bottom of the business models, strategic networks and value-creation architectures of the case companies. The interviews were held and transcribed in Finnish. Given our research questions, senior managers were seen as viable sources of information in the critical evaluation of the representativeness and validity of the data. In addition to conducting our intensive field study, we collected an extensive set of secondary data on the companies, comprising internal documents, brochures, bulletins and annual reports, presentation material, reviews, and www sites.

In this study, we analyze the roles and goals of collective action networks in five cases. The cases characterize different value systems from the perspective of selected focal software companies. Our case selection criteria consist of the type of the value system and the existence of identifiable collective action as part of their software business. The role of collective action based on non-economic exchange is analyzed in regard to the for-profit business model in each of the cases. For this purpose, the business models of the case companies are identified according to the business-model classification scheme presented by Rajala and Westerlund (2005). A summary of the case companies and a brief description of their business models are presented in Table 1.

Table 1 Summary of the cases

Summary of the cases					
Case	**Age (yrs)**	**Nr. of empl.**	**Type and description of the business model**	**Goal of collective action network (as a part of the business model)**	**Type of value system**
Case A	40	>100	Standard offerings: Model-based software products for narrow segments such as building and construction, and energy supply	Market sensing and ensuring future revenues by influencing on market decisions and legislation	Stable, well-defined value system
Case B	~4	<30	Transactional software & semi-finished solutions: An integration platform for electronic business solutions	Development of new standards and influencing on legislation, regulation and market-wide practices	Emerging value system, radical changes
Case C	5	<50	System solutions: Customer-specific software service based on an automated model-based test generator	Influencing dominant institutions, market sensing and developing markets for incremental innovation by market presence & indirect sales promotion	Established value system, incremental improvements
Case D	11	160	Standard offerings: Database software based on open source software concept	Development of both technological solution and user base	Emerging value system, radical changes
Case E	35	>100	System solutions: Information-system solutions for statutory pension insurance companies	Joint IT and system development for scale economies	Stable, well-defined value system

Empirical Findings

In the following paragraphs, we classify our case descriptions according to the three types of value systems presented in our initial framework. The value system types are: (1) Stable, well-defined value system, (2) established value system characterized by incremental improvements, and (3) emerging value system characterized by radical changes. We identify the distinctive value system type in each of our cases and report our key empirical findings on the roles of collective action in connection with the identified value systems.

Collective action in stable, well-defined value systems

Case A

The focal company in Case A develops and markets model-based software products and solutions with related services for infrastructure management in construction and energy industries. The value proposition of Case A aims at assisting clients to effectively manage structural information, e.g. on complex building projects. In its three separate business areas, the company develops and sells its software and services for the international market. During its 40 years of operation, the company has grown steadily from a systems engineering team of few employees into an international software vendor with approximately 300 employees. Currently, the company has subsidiaries in 12 countries. These local business units coordinate distribution partnerships in different market areas. According to the managers interviewed in this case, the actors and activities in their value network are rather well established. Thus, we identify that Case A describes a stable, well-defined value system.

Identified collective activity in Case A includes participation in three collective action networks. In the first one of them, the focal company cooperates with industry associations in the USA in their solution domain. One of our interviewees, the Vice President responsible for corporate planning of the company in Case A, described the intentions to participate in collective action networks as follows[1]:

[1] Quotations from transcribed interviews are translated from Finnish by the authors.

> *"In the USA we have non-commercial collaboration with industry associations, such as the association for steel producers, which collect market information and influence market development. We have a tremendous need for information of this kind, which cannot be produced by any single actor, nor obtained commercially." (VP of corporate planning, Case A)*

Thus, the goal of this collaboration is to gain insights in the development of customer needs and various institutional patterns in the field, as well as to collect information on legislation and attempt to affect regulations.

In the second identified collective action network, the focal company in Case A has collective action with universities for the market promotion purposes. This activity, which is largely based on dyadic ties or small-scaled networks, aims at increasing potential customer base among university students and attempts to influence the future opinion leaders in selected industries. The company in Case A provides resources and software for universities primarily without economic exchange. Although the joint education activity is conducted free of charge, the purpose for the company in Case A to participate in university education could, however, be interpreted as an investment in sales promotion to increase its own future profits, and, to a lesser extent to promote mutual benefits of the network. We interpret the identified role of collective action in these two instances as supporting existing business in a stable value system.

In addition to these two collective action networks, the focal company in Case A has collective research and development activity with universities and research laboratories including academic actors that develop next generation technologies and act as intermediates between users and developers.

> *"We have collaboration with several universities, industrial organizations and research laboratories focusing on joint innovation activity to develop next generation modeling solutions, which supports our product development. This collaboration is based on either development agreements or incidental relationships with specific actors, including university faculties and individual professors." (VP of corporate planning, Case A)*

As opposed to the previous two instances of collective action, we identify the value system in this third instance as established value system characterized by incremental improvements. Accordingly, the collective action here facilitates the development of current business through incremental development of technology.

Case E

The focal company in Case E was founded by major insurance companies in Finland to provide them with information technology services and system solutions in the field of insurance management. The interesting feature of Case E from the perspective of this study is that the practical appearance of collective action is organized as a distinct company jointly owned by actors in this collective action network.

The motivation for the founders to establish the joint venture in Case E was an attempt to increase both effectiveness and cost-efficiency through collaborative application development approach compared to their own in-house application development. The goal of this collective action network for insurance companies is to jointly develop their information systems, and, to maintain the systems in accordance with changing regulations (e.g. tax legislation).

> *"Systems used in insurance policy management are overwhelmingly heavy, complex and expensive. This is why insurance companies have selected not to compete with each other by systems development related to basic information infrastructure, but instead, they seek cost efficiency through joint development of these systems." (Head of finance and administration, Case E)*

This collaboration forms the *raison d'être* of the company, which is a formal outcome of collective action in Case E. Our transcription of interviews describes this as shown in the following quotation:

"Our business model is based on a multi-customer situation where our customers participate actively in the entire systems planning, development and testing process with our staff. In the system specification phase, insurance companies seek consensus that meets the needs of all users sufficiently." (Head of finance and administration, Case E)

The basic information systems in insurance companies have extraordinary long life cycles, reaching up to 20 years. These systems are mainly developed with minor incremental modifications. Furthermore, collective action network includes shared usability and maintenance services provided by a commercial partner company.

The company operates in close partnerships with its customers, i.e. insurance companies, by providing them with customized information system solutions based on a common platform. More than 50 % of the turnover of the company comes from these customers that are also owners of the joint venture. This case exemplifies a hybrid form of collective action including not only non-economic, but also some economic exchange. Due to the nature of this collaboration, the company does not seek profit but continuously aims to stay at break-even result, although it has some economic exchange with the actors in the network. The focus of this action is on the joint information systems development, whereas commercial delivery, operation and training of the systems are acquired from a profit-seeking partner.

The following quotation illustrates the collective action related to the basic information systems where the actors do not compete with each other. According to the literature of collective action, we identify these systems as public goods, i.e. non-excludable products that are jointly developed and equally available to all participants.

"The actors of this network compete in other areas of information systems, e.g. in Internet services and other solutions related to their customer interfaces. Because these other areas form competitive factors for the companies involved, they produce the required solutions internally or obtain them from other, commercial providers." (Director of customer services, Case E)

Thus, the actors in the network aim at seeking individual competitive advantages in other areas of information systems related to this basic infrastructure. In this respect, Case E exemplifies a institutionalized form of collective action between actors sharing similar needs. The case illustrates a stable, well-defined value system, in which the collective action network seems to support the existing business of the participating actors.

Collective action in established value system characterized by incremental improvements

Case C

The focal company in Case C focuses on development and marketing of software testing and quality assurance tools. The offering of the company is based on a modifiable system solution (MOTS) and consists of an automated model-based test generator and related consulting, support and training services. In brief, the key value proposition in Case C is aimed at helping customers by enhancing their software testing processes through replacing their manually written test scripts with automatically generated test cases. This case illustrates two instances of collective action in system solution business.

The focal company in Case C is a member of two collective action networks, with different goals and purposes. The first network aims at strengthening a user community, which is found beneficial in gaining insights into markets. In addition to the company in Case C, the members of this network include software tool developers, consulting and training companies and information systems magazines. The members of this network do not seek direct profit through this collaboration, and economic exchange, if any, is incidental in these relationships.

"We have found that collaboration with other actors in the industry for market sensing is the best way to conduct market research. --- We participate in a community of software industry actors including magazine publishers, tool developers, and training and consulting houses. --- This community forms a network that organizes joint events for

customers. In these seminars software companies discuss their testing needs and possible solutions." (CEO, Case C)

The other identified collective action network in this case includes various industrial partners, research organizations and standardization bodies. The goal of this other network is to develop a new testing standard, i.e. to facilitate the institutionalization of common practices in the field. This activity aims at diminishing the wide range of unestablished, alternative standards to improve the industry level efficiency.

"We have an agreement with some industrial partners, including industrial conglomerates, telecom manufacturers, public research organizations, and various industrial enterprises. This collaboration aims at establishing new pan-European standards for software testing." (CEO, Case C)

We identify the value system of Case C as an established value system, which is characterized by incremental improvements of the existing business. From the perspectives of our study, it is noteworthy that these improvements are sought through two above described instances of collective action. Thus, the role of collective action networks in this case can be identified as facilitating the development of existing business.

Collective action in emerging value system characterized by radical changes

Case B

The focal company in Case B is a software company that develops offerings for the emerging field of electronic invoicing. Also, the company markets and sells commercial off-the-shelf enterprise software in a business-to-business setting. The company was founded in the mid 1980s and the ownership was restructured in the early 1990s through a management buy-out. The company was listed on a local stock exchange ten years later. A profound feature describing the offerings of Case B is their interoperability and compatibility with major financial administration and enterprise resource planning (ERP) solutions.

"Electronic invoicing forms an emerging field of business that lacks existing infrastructures and actors. --- We collaborate with several partners and potential value system participants that seek new business opportunities and try to establish a network of bitpipes [telecom carriers], hosting service providers, registry service providers, complementary technology providers and key customers." (Managing director, Case B)

The initial motive of the identified collective action network was to develop technological infrastructure and industry standards for the emerging field of electronic invoicing. This network included numerous actors from different sectors, e.g. software tool developers, application developers, application service providers, Internet service providers and governmental organizations. In the early stages of networking, it was unclear, which would be the key actors in electronic invoicing, and what kinds of actors are needed in the emerging business. Furthermore, it was difficult to figure out the profit opportunities and related business models for different actors. Hence, various types of actors were invited to the network. Later, the focus of this collaboration shifted from the development of technological infrastructure to increasing the use and supporting the growth of the electronic invoicing. The identified collective action network has faced several changes, as new types of actors have joined the network and some existing actors have departed from it. For example, user registry service providers were found essential to promote the market development.

This case illustrates an emerging value system, which is characterized by radical changes in both the business environment and business models of involved actors. In this case, new business opportunities are explored through a collective action of key initiators in the field. Thus, we identify the role of collective action network as enabler of new business.

Case D

The existence of the focal company in Case D is strongly dependent on collective action in the global open source software development community. The company was founded by three technological

experts from two Nordic countries who joined their efforts to develop a software solution to meet their shared needs. The solution is a database engine that conforms to the dominant database language standard SQL. It is developed and distributed according to the principles of the open source software community.

> *"In 1995, as the Internet started becoming common in business use, there occurred recurring needs to get data out of databases in different web programming projects. For me, the development of an SQL interpreter became necessary and I pondered whether someone else had similar needs. I joined a colleague from --- to develop a generic database solution. We also found a trouble-free license format which we used to publish our proprietary database product in the Internet with its source code for the first time in 1996." (CTO, Case D)*

The above quotation from the chief technical officer of the company in Case D depicts that personal intellectual capital related to the technology development was combined through social networking of the key individuals. Later, the actors of this coalition identified that a large group of potential customers share this same need. The key individuals founded the case company to catch these market opportunities. In the later phases of the business life cycle, this network expanded to include a large number of various developers and other collaborators as well as up to five million users in the open source software community, and the requirements for the network management competencies became increasingly important.

> *"We would never have gained 5 million users to our database product without acting actively according to the principles of the open source software community. Since we first released our software under an open license, we have gathered feedback --- development ideas, problem descriptions and solutions --- and responded to all possible initiatives from the user community to develop the product with the skillful individuals using the product. --- Now we need to balance between the two networks, the open source community where some key individuals hate all commercial stuff, and the commercial business environment including banks etc., where we need the credibility of a commercial software vendor." (CEO, Case D)*

This network has evolved from a social network of few individuals without profit aspirations into a large profit-seeking business network. However, the operating logic of the network is continuously based on the principles of collective action. In other words, this network embodies a lot of non-economic exchange collaboration in both development and distribution of software offering. The collective action in this case aims at increasing the customer base, developing the software offering and related technology. This case depicts an emerging value system with radical changes and the collective action in this case seems to have a role as an enabler of new business.

Summary of Findings

On the basis of our findings, we identify that collective action networks, i.e. relationships based on intentional non-economic exchange, seem to have different roles in different types of value systems. These identified roles include supportive, facilitative, and enabling roles in the for-profit business models of companies.

Based on the analysis of our findings, we see that in stable, well-defined value systems, collective action: (1) forms a minor part of the activity in the value system, i.e. it is based on dyadic relationships or small-scaled actor networks; (2) supports seeking efficiency of operation; (3) may become institutionalized and take forms of formally organized networks or even joint ventures; (4) aims at sustaining the competitiveness and extends the life cycle of the existing value system; and (5) exist in hybrid forms of non-economic and economic exchange relationships with not-for-profit purposes. To summarize, in stable, well-defined value systems, collective action seems to have a *supportive* role in the existing business.

Respectively, in established value systems that are effected by incremental improvements, we see that collective action networks *facilitate* the development of current business. In this type of value systems, collective action: (1) forms a moderate part of the activity in the value system; (2) facilitates the extension of value systems through incorporating new actors to the existing system; (3) facilitates

incremental improvement of innovations and existing value propositions; (4) exists to a moderate degree in the form of non-economic exchange as part of the participants' for-profit business models; and (5) appears through small or medium-scaled actor networks within the value system.

Our findings suggest that in emerging value systems, collective action: (1) can form a major part of the activity in strategic networks; (2) enable the development of radically new innovations and value propositions; (3) connect a large number of new actors to emerging networks; (4) enable the formation of new network structures; and (5) incorporate plenty of non-economic exchange relationships and enable effective opportunities for the exploration of new business opportunities. To sum up, in emerging value systems embodying radical changes in value production architecture, collective action seems to have an *enabling* role in capturing new business opportunities.

On the basis of these findings, we enhance our framework to include the identified roles of collective action networks in relation to the different types of value systems. The improved framework is presented in Figure 2.

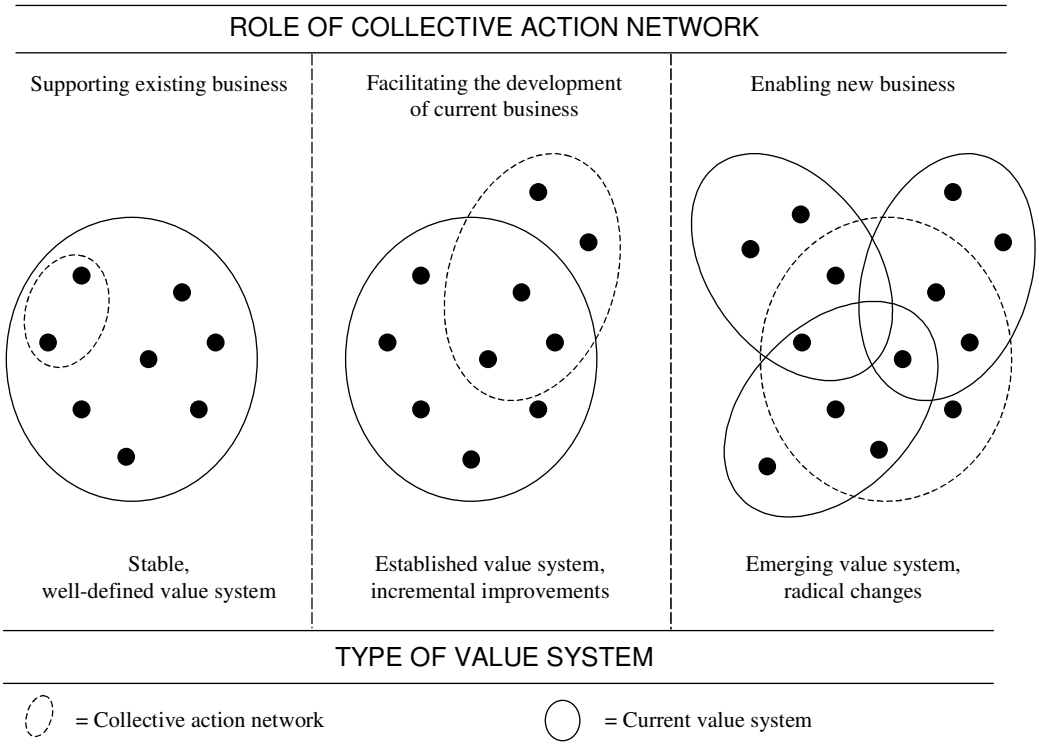

Figure 2 Improved framework for the value system classification of collective action networks

Discussion and Conclusions

In regard to our first research question on the kinds of collective action networks that exist in the business of software companies, our empirical findings reveal several types of networks based on collective action. These include, e.g. innovation and development networks, networks aiming at market and future sensing, technology standardization networks, etc. Some of the identified collective action networks consist only of business actors, whereas some of them include a large number of individuals, thus, being essentially consistent with the findings of prior studies emphasizing social networks. Furthermore, some of identified collective action networks are rather informal in nature, whereas others are institutional, formally organized through contracts and agreements.

In regard to the second question on the roles of collective action networks for the business of a software company, we identify that collective action with non-economic exchange has divergent roles in different value system settings. In this study we have identified three divergent roles of collective action networks in the businesses of our five cases. We use the concept of value systems as a basis in the identification and analysis on the roles of collective action networks in different business

settings. Our empirical results provide evidence that collective action networks vary systemically between different types of value systems. Two of our five cases exemplify collective action networks that have a supportive role for the existing business. In addition, one instance of collective action networks identified among our cases facilitates the development of current business primarily, and, another instance has this role secondarily. Also, two of our cases embody collective action networks that enable radical changes in the business.

First, non-economic collective action in *stable, well-defined value system* can be utilized to support the existing business. In our cases, collective action network supported the existing business by, e.g., providing access to information needed in market sensing. Also, it provided efficient ways to affect institutional patterns in the market. Second, in the *established value system* with incremental improvements, collective action seems to facilitate the development of current business. In the stable type of value systems, the supporting role points to the activities that are *sine qua non,* a prerequisite for efficiency and maintaining competitive positions of actors in the value system, e.g. through market sensing. In the established type of value system including incremental improvements, the facilitating role refers to advantages that collective action provides in the development of the current business, e.g. in terms of diminishing risks and engaging required actors in the continuous change of business environment. Third, in *emerging value systems* characterized by radical changes, collective action is identified to have an enabling role in the development of new business opportunities. By enabling role, we refer to the advantages of collective action as compared to economic exchange in the development of completely new business areas. Examples of these include creating technological infrastructures and customer base for radical innovations. One of our cases highlights that non-economic collective action provides a superior way in creating a large network up to millions of co-developers and customers for new software solutions in a short period of time. This profound feature of collective action has created totally new business models such as software businesses based on the open source software phenomenon.

As the main *theoretical implication*, this study contributes to the field by providing a new conceptual outline that can be used to analyze the roles of collective action in different types of value systems. In addition, this study provides insights on non-economic exchange within strategic networks. This may lead to future conceptual development of the types and roles of collective action networks in business. *Managerial implications* include increasing the understanding on the roles and possibilities of non-economic activity in business, and, in the development of competitive business models. For managers, the findings of this study provide support for understanding different roles of non-economic exchange relationships in different types of value systems. In stable value systems, our findings can provide managers with ways to improve and maintain efficiency of operation. In incrementally changing value systems, managers can encourage collective action to facilitate the development of business. In emerging value systems, collective action may enable capturing new business opportunities.

Our findings support the view of Brito (2001) in that collective actors are sometimes set up simply to address the resolution of a specific problem and as soon as progress is made on that front, the role of collective action changes along with the dynamics of the value system. Specifically, this means that along with the development of a value system towards more established forms of operation, collective action generally becomes replaced by economic exchange relationships, and its relative proportion of the value system's activity decreases. On the basis of this indication, we see that the findings of this study might be generalized to other industries beyond software business. As a limitation to the current study, however, we recognize that in addition to the role of network, which is the primary focus of this study, there are other approaches to distinguish between different types of strategic networks. These include the purpose of the network, structure of the network, as well as the degree of formality of networks, i.e. institutionalization of cooperation, and other possible dimensions. These issues provide interesting avenues for further research on collective action in industrial networks.

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