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Exposing the role of relational capabilities in business–research–government cooperation: examples from the transition towards a bioeconomy in Finland

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ABSTRACT

An organization's capability to build, handle and exploit relationships and learn from these relations, defined here as relational capabilities, is increasingly important in a networked economy and in innovation activities. The paper introduces a framework that helps understand and analyse the relational capabilities of various organizations engaged in innovation activities. Based on theoretical discussion and empirical analysis the paper argues that the literature on organizational level capabilities and relational capabilities would benefit from deeper integration with the systems of innovation perspective. The empirical findings from three Finnish regions indicate that relational capabilities become particularly relevant in research–business–government cooperation contributing to innovation in the field of bioeconomy. Relational capabilities embedded in an organization's capability configurations can boost the efficient use of that organization's resources, bring greater flexibility, a chance to create value in networks and support renewal and innovation. Missing or underdeveloped relational capabilities may also hinder an organization's ability to tap into the economic opportunities that arise leading to failures at the regional and system level thus hampering the transition towards a bioeconomy.

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1. Introduction

In a networked economy and rapidly changing environment, the capability to engage in collaborative value creation and joint innovation activities has become increasingly important for companies and other organizations involved in innovation activities. A resource-based view of the firm (Barney 1991; Penrose 1959; Wernerfelt 1984) has exposed the importance of the capabilities of economic actors in innovation-led growth (Carlsson 2007; Cooke 2007; Edquist 1997) while the systems of innovation (SI) approach (Cooke, Uranga, and Etzebarria 1997; Klein Woolthuis, Lankhuizen, and Gilsing 2005; Lundvall 1992) in particular has enhanced our understanding of the

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networked and institutional context in which innovation takes place. Recently, a growing segment of the literature on the capability perspective has focused on those relational or network capabilities which play an important role in an organization's value creation, renewal and efficient use of resources (see e.g. Kohtamäki, Rabetino, and Möller 2018; Ritter and Gemünden 2003; Vesalainen and Hakala 2014). Following these theoretical notions, the capability of organizations to build, handle and exploit relationships and learn from these relations, defined here as relational capabilities, has become an increasingly important unit of analysis.

However, relatively little attention has been paid to the relational capabilities of the various actors that engage in joint innovation activities and systemic context of these capabilities. In business economics, the capability perspective and relational capabilities have been studied mainly in regards to business networks with a focus on firm-level capabilities, meaning that less attention has been given to the broader view of regional networks and networks consisting of various organizations (e.g. Rosenberg Hansen and Ferlie 2016; Uyarra 2010). Correspondingly, failures in respect of capabilities have often been rather inadequately addressed while a deeper analysis of capabilities clearly remains absent from the literature concerning systems of innovation (see e.g. Carlsson 2007; Laasonen and Kolehmainen 2017).

Moreover, many European countries and regions are pursuing innovation-led growth or an even more ambitious mission-oriented approach to support networked innovation activities and enhance systemic changes in the society, such as a change towards a bioeconomy (see e.g. Mazzucato 2016; Weber and Rohracher 2012). Consequently, the rise of bioeconomy (or a bio-based economy) has become one of the key drivers in the economic renewal of regions and one of the key substance areas of the research and innovation policies conducted by the European Union (European Commission 2020). In recent years, a growing number of studies have also begun to highlight the different starting points and capabilities of regions, industries, clusters and organizations in the green transition (see e.g. Cappellano et al. 2021; Sjøtun and Njøs 2019; Sotarauta and Suvinen 2019).

The concept of bioeconomy is multifaceted (Birch and Tyfield 2012), but can generally be defined as a branch of the economy which relies on the use of renewable biological resources to produce food, energy, products and services (European Commission 2012). The transition towards a bioeconomy and the potential for exploiting economic opportunities and facilitating innovation in this field requires resource and capability pooling across various organizations as well as the promotion of various cooperative inter-organizational activities and processes supporting innovation (cf. van Lancker, Wauters, and van Huylenbroeck 2016). Moreover, political agendas, goals, regulation, public infrastructure and investments and the development of specialized clusters, particularly at the regional scale, also play a crucial role in facilitating innovation and the transition towards a bioeconomy (De Besi and McCormick 2015). Consequently, failures in relational capabilities may hinder regions' transition towards a bioeconomy and various organizations from tapping into the economic opportunities that arise.

These recent theoretical and practical notions raise important analytical questions about the capabilities required in networked innovation activities. In the spirit of theoretical and empirical advancement, the aim of this paper is to further explain the concept of relational capabilities and expand the literature on relational capabilities and organizational level studies. By analysing the dynamics of relational capabilities in various

organizations and the role played by such relational capabilities in research–business–government cooperation, this study adds a systemic understanding to the literature concerning relational capabilities. The paper addresses the following research questions:

- How can we define crucial relational capabilities in business - research - government cooperation?
- How can relational capabilities be further understood in systemic context?

2. Theoretical discussion

2.1. *The capability perspective and organizational capabilities*

To understand the nature of an organization's capabilities and the role of its relational capabilities, it is crucial to elaborate on the rich and fragmented conceptual background of the capability perspective. Inspired by the resource-based view of the firm (Barney 1991; Penrose 1959; Wernerfelt 1984) the capability perspective has been widely discussed and applied, particularly in organizational and management studies. In addition to firm-level studies, the capability perspective has been studied in public sector organizations (e.g. Rosenberg Hansen and Ferlie 2016). Moreover, it has also had an important influence on the field of innovation and regional studies (see e.g. Boschma 2004; Uyarra 2010). The capability perspective has contributed to our understanding of how firms exploit and develop their heterogeneous resources to gain a sustained competitive advantage (Sanchez and Heene 1997, 304). In the regional context, the capability perspective reflects the idea of regional accumulation and the interaction of resources and capabilities which provides a competitive advantage against other regions (Boschma 2004; Cooke 2007; Laasonen and Kolehmainen 2017; Lawson 1999; Maskell and Malmberg 1999; Storper 1997).

Based on these fundamental notions, there are numerous ways in which the capability perspective has been applied to the organization, management, innovation and regional studies. Following the hierarchical capability structure proposed by Wang and Ahmed (2007) resources are seen as the foundation of an organization providing the basis for how an organization's capabilities and resources are deployed (see Vesalainen and Hakala 2014). Resources are referred to here as tangible (e.g. people, machines, etc.) and intangible resources (e.g. skills and knowledge capital, social relationships, brand, values and culture, etc.). Given the premise that capability is a somewhat higher order term (cf. Vesalainen and Hakala 2014; Wójcik 2015, 88–91), it refers to the possession and exploitation of bundles of distinct cumulative resources and to a collaborative process (developed through routines) to take action and do something successfully and efficiently. To put it simply, capabilities are defined here as activities and processes to mobilize, manage and deploy resources and unleash their full potential (Amit and Schoemaker 1993, 35; Vesalainen and Hakala 2014, 939).

The capability perspective also recognizes concepts such as core capabilities (or competences) and (Wang and Ahmed 2007) dynamic capabilities (Eisenhardt and Martin 2000; Teece, Pisano, and Shuen 1997). In this paper, capabilities, core capabilities and dynamic capabilities are not separated. Here the concept of capabilities simply embodies

the notion of (a) capabilities that are strategically important and (b) capabilities that are dynamic in nature (including developing and learning) and change and renew resources in reference to a changing environment.

Even though various organizations are driven by different logics, the applicability of the capability perspective has been confirmed in many studies for various kinds of organizations. The capability perspective has been applied both in studies on public and semi-public organizations (e.g. Bryson et al. 2007; Pablo et al. 2007; Peteraf and Barney 2003) as well as in higher education institutions, particularly from the perspective of university-industry collaboration (e.g. Leischnig and Geigenmüller 2020). As firm innovation is driven primarily by competitive advantage, the public sector driver is achieving widespread improvements in order to increase public value (Moore 1995). These goals can be enhanced through collaborative arrangements which shift the focus of public or semi-public organizational capabilities towards networked governance and collaborative innovation in networks (Hartley 2005).

Limitations however exist which need to be considered when analysing public or semi-public organizations. They relate primarily to the nature of the organization and the degree of autonomy (Rosenberg Hansen and Ferlie 2016). Nonetheless, the capability perspective focuses on the value creation and the goal of efficiency which are both relevant aspects in public organizations, as it is important to organize, use resources efficiently and create (public) value. Rosenberg Hansen and Ferlie (2016, 12) reflect that public organization resources also need to be valuable, but they do not necessarily need to be rare and inimitable. They continue, that '[...] it is not the ultimate goal to control resources that others do not have or cannot get'. Rather, public organizations '[...] build and reconfigure internal resources and competences which are then integrated with other organizations within more partnerships and collaborations' to fulfil the organization's mandate and mission. Many public organizations have to adapt to new situations and requirements rapidly and some have changed to being quasi-market organizations which means that they now use market-like logics with a greater focus on competitive advantage (Rosenberg Hansen and Ferlie 2016, 12).

2.2. Relational capabilities

Previous studies on the capability perspective raise a very fundamental notion concerning the network economy. Resources and capabilities may span organizational boundaries and may be embedded in inter-organizational resources, cooperation processes and activities (Dyer and Singh 1998). These capabilities may play a significant role in organizations' value creation, efficient use of resources and renewal.

Consequently, a growing body of literature on the capability perspective has become interested in relational, network or alliance capabilities and these capabilities have thus become an increasingly important unit of analysis (see e.g. Kohtamäki, Rabetino, and Möller 2018; Leischnig and Geigenmüller 2020; Vesalainen and Hakala 2014). These notions have rendered the literature rich in concepts and thus studies on relational capabilities lack a coherent theory (Kohtamäki, Rabetino, and Möller 2018, 188). However, relational capabilities are referred to here as activities and processes to build, handle and exploit relationships and learn from these relations. This does not imply that relational capabilities always or alone play a crucial role in the organization's capability

configuration. Rather, the studies suggest that relational capabilities are embedded in an organization's capability configuration to create and capture value in networks and support renewal and innovation (cf. Kohtamäki, Rabetino, and Möller 2018, 196).

Digging deeper into the manifestations of relational capabilities at least three broad, important and also highly interconnected aspects can be identified (cf. Kohtamäki, Rabetino, and Möller 2018). Firstly, relational capabilities can be associated with management-oriented capabilities, such as coordination and the management of network relations. Many studies also highlight the need to identify and evaluate potential complementarities in external assets and capabilities and the role of a dedicated alliance function (e.g. Dyer and Singh 1998, 668; Kale and Singh 2009). Moreover, the fundamental question here is how to understand an organization's resources and capabilities in relation to external resources and capabilities (see Santos and Eisenhardt 2005).

Secondly, relational capabilities are associated, in broader terms, with the capability to foster interaction and integration between network partners in structural and social terms. Kohtamäki, Rabetino, and Möller (2018, 193) emphasize that this aspect plays a dominant role in the relational capability literature and refers to 'managing the depth' of network relations by developing both network structures and social integration. Activities related to structural and social integration enable both effective exploitation of external resources and capabilities as well as knowledge-sharing between partner organizations (see Dyer and Singh 1998, 669–671).

Thirdly, networks can function as knowledge-creating platforms (Vesalainen, Valkokari, and Hellström 2017, 7–10). Thus, relational capabilities are related to learning processes and knowledge-sharing, but also to the taking and sharing of risks (Ritter and Gemünden 2003; Varamäki and Vesalainen 2003) which can be associated with an entrepreneurial orientation to facilitate organizational and network-level innovation and development. Relational capabilities can also support efforts to be a forerunner in terms of identifying and capturing emerging opportunities, anticipation of future demand, R&D experimentation and investments in uncertain outcomes (cf. Kohtamäki, Rabetino, and Möller 2018, 194). However, very little is known about the foundations of different types of relational capabilities in systemic context and in networks consisting of various actors.

2.3. The systems of innovation approach and the capability perspective in regions' economic renewal

A number of theories have been developed and an increasingly interrelated field of research has tried to understand the regional economic renewal process. This conversation has increasingly centred around knowledge and innovation-driven development, particularly the systems of innovation (SI) approach. The main emphasis here is on the entire system of innovation and a wide range of initiatives which are linked to science and technology and to both the supply and demand for innovation (Edquist, Luukkonen, and Sotarauta 2009). The path-dependent and systemic nature of innovation and learning processes also point to the popularity of studies on organizational level capabilities (Maskell and Malmberg 1999; Uyarra 2010). The capabilities for innovation are distributed across a network of actors, such as firms, educational and research organizations, intermediaries and their relationships. The capabilities of firms are thereby

shaped in interaction with the surrounding resources, structures and institutions (e.g. Cooke, Uranga, and Etxebarria 1997; Etzkowitz 2008). Moreover, the capabilities of actors and their interactions are a crucial element in determining the economic system's (innovation) performance (Carlsson 1998, 158). Studies on regional innovation systems and the triple helix model in particular emphasize the capabilities of various regional actors as regards their close interaction and capability to cooperate in fostering innovation and economic growth (e.g. Asheim and Isaksen 2002; Etzkowitz 2008).

The SI approach has also fostered debate on the role and importance of innovation policy, thus guiding the actions and capabilities of the public organizations that influence innovation activities (Edquist 2011, 1725). Generally, the innovation policy discussion highlights the shift from the traditional market failure approach to broader system failures (Edquist 1997). These systemic rationales propose various ways to categorize and address the elements of system failure (Bergek et al. 2008; Chaminade and Edquist 2010; Klein Woolthuis, Lankhuizen, and Gilting 2005; Smith 2000) which hinder and/or block learning and innovation in respect of economic actors impacting the innovation system. More recently, the transformational system failure approach (Weber and Rohracher 2012) has complemented this view and discussed the role of innovation and innovation policy in regards to solutions to grand societal challenges and in enhancing systemic changes in society, such as the change towards a bioeconomy.

The literature suggests that the lack of appropriate capabilities and resources at actor and firm level may prevent access to new knowledge and lead to an inability to adapt to changing circumstances and to grasp or open up to new opportunities (e.g. Weber and Rohracher 2012, 1045). Failures in interaction or networks (see Chaminade and Edquist 2010, 104) may inhibit the exploitation of complementary sources of knowledge and capabilities as well as processes of interactive learning. Missing or underdeveloped capabilities or interaction and networks may also lead to other failure types, such as infrastructural, institutional, directionality, demand articulation, policy coordination and reflexivity failures (see Weber and Rohracher 2012, 1045).

In conclusion, the system and network approach to innovation suggest a stronger focus on agency and various actors and their capabilities and interaction (Cooke and Morgan 1998; Flanagan, Uyerra, and Laranja 2011, 811; Morgan 1997). Moreover, relational capabilities should be understood in the systemic context. Correspondingly, the systems of innovation literature and regional studies would also benefit from a profound understanding of what capabilities are required in networked innovation activities to pool resources and capabilities of various organizations and to exploit networks. Although the importance of capabilities and their complementarity is recognized, capabilities are loosely referred to in the literature concerning systems of innovation.

3. Research design, context and methods

The empirical analysis is based on qualitative research methods enabling us to understand the elements of relational capabilities in research–business–government cooperation and the systemic context of these capabilities. The main empirical data is based on 40 one-on-one, in-depth, semi-structured interviews with the representatives of companies, regional and business development agencies (RDAs), municipalities and research and educational organizations (REOs) in three Finnish city-regions, namely

Joensuu, Jyväskylä and Seinäjoki (see Table 1, Appendix). Supplementary organization-specific material, such as their websites and relevant regional innovation policy documents from the three city-regions were also used as secondary data to provide further insight into the context in which these organizations operate.

The three city regions are not compared as such. The purpose here is to follow a descriptive case study approach to identify the role of relational capabilities in various organizations from three contexts to better structure previous theories in the light of the observed results (cf. Voss, Tsiriktsis, and Frohlich 2002). Thus, the data from the three case regions and key organizations promoting bioeconomy is used to strengthen the research design.

The city-regions where empirical study was conducted were part of the national innovation policy programme (INKA, Innovative Cities programme) which aimed to strengthen regional innovation centres. The programme was launched in 2014 and ended in 2017. It provided fertile ground for exploring relational capabilities because it aimed to facilitate innovation and generate new business in close local cooperation and the pooling of resources between research and educational organizations, companies, cities and other regional development organizations in specific thematic areas of economic importance to Finland.

In Finland, the rise of the bioeconomy has been recognized in the field of innovation policy. The course has been set towards a low-carbon society and a sustainable economy. Finland already has a long tradition of promoting the networked, facilitative and system-oriented implementation of innovation policy and thus supports networks of public and semi-public organizations to implement innovation policy at a regional level (see Sotari and Kautonen 2007). Moreover, the introduction of Finland's Bioeconomy Strategy (Suomen biotalousstrategia 2014) emphasized the mission-oriented nature of Finnish innovation policy and enhanced systemic change in society (see also Bosman and Rotmans 2016; Scordato et al. 2021).

The city-regions mentioned in this article are regional centres which each specialize in their own area of bioeconomy. The Joensuu city-region focuses on forestry-related bioeconomy, forest biomass technology, new materials, the software industry and technology. The city-region has a strong concentration of actors in the forestry industry, forestry research and educational organizations. Companies and research organizations in the region have strong expertise in forest harvesting and bioenergy, as well as in the forest machine industry and technology companies.

The Jyväskylä city-region focuses on resource-efficient solutions. The region has a strong forestry sector, with particular emphasis on expertise in the paper, pulp and process industries and bioenergy. The region boasts large, export-oriented, companies in the forestry industry and a diversified SME sector. The city of Jyväskylä and the Regional Council of Central Finland are active in promoting resource-wisdom solutions in the area with businesses and REOs.

The Seinäjoki city-region focuses on agro-bioeconomy, that is, sustainable and effective solutions for food systems. The region has significant expertise in the food sector and in the manufacturing and technology industry related to the food sector. The region is very SME-intensive and has a strong entrepreneurship tradition, though regional expenditure on R&D is quite low. Unlike Joensuu and Jyväskylä, Seinäjoki does not have its own university. Thus, significant efforts by local public organizations,

REOs and businesses to develop a multidisciplinary and networked innovation environment in the city-region have been undertaken.

The interviews in the case regions were conducted in Finnish between October 2015 and January 2016 and were recorded and transcribed. Interviewees were chosen according to the innovation policy programme framework such that interviewed organizations were recognized as the key stakeholders promoting innovation activities in the field of bioeconomy. Interviewees from companies were mainly CEOs or those responsible for R&D activities. In the other organizations, interviewees were those whose responsibility it was to promote bioeconomy-related innovation activities.

The research process can be viewed as abductive, in which a theoretical framework has guided the approach to empirical study and supported the analysis of the results. In order to understand how the interviewees perceived their organization's capability configuration and relational capabilities within it, the method was to guide the interviews from broad and open questions towards more specific questions by identifying, challenging and verifying the capabilities of the organization (cf. Vesalainen and Hakala 2014). Thus, the interview themes were influenced and constructed from the theoretical capability framework, but the idea was not to impose prior constructs or theories on the interviewees.

Each interview was organized in three parts. After a brief discussion on background information, in the first part of the interview the interviewees were asked to describe the most important developments in their organization's operational environment. In the second part of the interview, they were posed the open question of how they would describe the most crucial elements behind their organization's long-term success in respect of the contemporary operational environment and the desire to support innovation (cf. Bryson et al. 2007). The interviewees were then asked to describe and debate these crucial elements in more detail. The aim here was to have them give examples and specify that these elements really appear in practice and are based on (the evolution of) their organization's resource allocations, certain knowledge or skills and/or certain activities and processes to mobilize, manage and deploy internal or external resources. In the third part, the interviewees were asked whether their organization has had to build, handle and exploit relationships and learn from them in order to achieve their organizational goals.

In the analysis phase, the observations were built into matrices reflecting various organizational and interviewee perceptions of their capabilities and to identify mechanisms as to how these relational capabilities are manifested in the different organizations' capability configurations. The data was then classified by seeking similarities and differences among the observations. The observations were formed into preliminary broader second-order themes and third-order dimensions. After this data-driven analysis, the emergent patterns were then reflected in terms of the theoretical framework. Upon consulting the literature, the analysis of the data can be viewed as transitioning from 'inductive' to a form of 'abductive' research, where data and existing theories and concepts were considered together (see Gioia, Corley, and Hamilton 2013).

4. Analysis of relational capabilities within organizations' capability configuration

In the first three sub-sections, the paper presents the organizational level findings, namely, how relational capabilities are reflected in different types of organizations. In

the last sub-section, the paper sheds light on the role of organizational-level relational capabilities in different systemic contexts to better understand the practical forms and needs related to relational capabilities.

A large number of important and path-dependent organizational characteristics were identified when interviewees were asked to describe the elements behind their organizations' long-term success and capabilities to support innovation related to bioeconomy. Moreover, the interviewees' impressions of the drivers in their operational environment largely influence the required capability configurations and the role of relational capabilities. Many of the characteristics and qualities identified by them were related to an organization's necessary changes in a rapidly changing operational environment and complex problems that demand networked, boundary-spanning innovation activity, often calling for diverse capabilities that do not exist within one organization or even within their immediate network.

In the following, empirical findings on relational capabilities are discussed through three different dimensions as well as in relation to how they relate to an organization's capability configuration: relational capability as embedded in an organization's strategy, as integrative capabilities and intertwined with entrepreneurial orientation. [Figure 1](#) illustrates how the observations were organized into second-order themes and third-order dimensions reflecting relational capabilities.

4.1. Relational capability as embedded in an organization's strategy

The analysis revealed that relational capabilities should be viewed as embedded in an organization's strategic logic as a whole. This implies that relational capabilities can be recognized in an organization's strategic thinking and procedures as to 'why' and 'how' to exploit networks (cf. Vesalainen and Hakala 2014, 948). Firstly, relational capabilities appear as a comprehensive understanding of the organization's role and 'value creation in networks' and in the identification of complementarities. The interviewees stressed the need to picture the organization's role in networks and its capability configuration in relation to other organizations. The strategic networking and decisions as to why exploit networks are also constantly challenged through the changes in the organization, the environment and the opportunities that arise.

Changes embracing broad-based and systemic innovation policy have changed the logic of how cities and many RDAs and REOs regard their role in innovation activities, while also pushing tight performance targets on REOs. Interviewees from city organizations stressed the need to undertake active efforts with all available tools and means to facilitate innovation in partnership with local businesses, REOs and development agencies to tackle current and future challenges in bioeconomy, such as sustainable food production, infrastructure, mobility, recycling and consumption. Opportunistic and active enabling of activities to support innovation were recognized as increasingly important in cities. Many RDAs consider their role to be that of active promoters of innovation networks and thus their core function is based on networking activities and facilitating multilateral cooperation.

Interviewees from REOs emphasized the need to be at the forefront of solving challenges related to bioeconomy. There is also a growing need to actively respond to external demand and integrate top-notch research and education holistically into companies' and

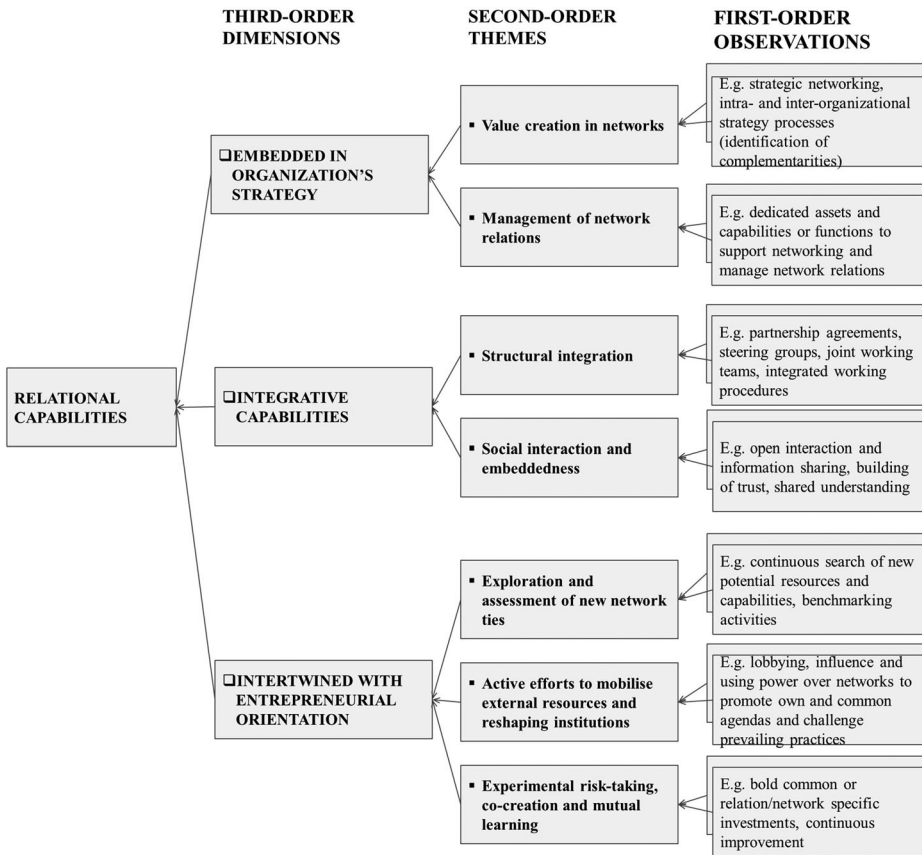


Figure 1. Findings on relational capabilities illustrated through first-order observations, second-order theoretical themes and third-order dimensions (see also Gioia, Corley, and Hamilton 2013, 20–22).

other partners' innovation activities. This increasingly requires the development of a partner role and new forms of interaction and collaboration. In higher education institutions this clearly refers to deepening the civic engagement role and capabilities that support innovation activities, not just the core functions of research and education.

Companies express relational capabilities as embedded in organizations' strategic logic by highlighting the need to build comprehensive solutions for customers. This requires closer vertical relationships with both customers and suppliers to work more effectively, create more value and recognize new business potential. Moreover, they highlight the need for horizontal allying with other firms, REOs and other partners to build networks in which they can collaborate by pooling resources, knowledge and technology, share risks and learn from one another (see Varamäki and Vesalainen 2003). Through strategic networking, companies guarantee that potential best know-how and employees are amenable to the organization and close to their boundaries.

Secondly, relational capabilities appear as the systematic 'management of network relations'. Strategic thinking and procedures on how to exploit networks emerge as dedicated resources and capabilities or functions to support networking. Cities have actively developed alliance experience and partnership-orientation by developing their functions

to support innovation related to bioeconomy sectors. One such example is the establishment of interrelated functions and teams such as development units to support the strategic exploitation and management of network relations. Employee training in procurement units and new know-how for the public procurement of innovation was also identified as an important measure here. Interviewees from RDAs strongly emphasized the need to put more effort into the systematic management of their networks, spending more time ‘in the field’ and building long-term relationships and strong ties with their partners. RDAs have also strengthened their know-how and recruited new people to facilitate and coordinate multilateral R&D projects.

REOs emphasized investments in civic engagement by, for example, establishing business service units or account manager vacancies (see also Leischnig and Geigenmüller 2020). Multidisciplinary and interrelated units and research groups are also regarded as a way to support external networking and generate value in cooperative R&D projects. Companies particularly emphasize the need to have systematic processes and functions to collect and assimilate information from customers’ needs and transfer this information into their internal target setting as well as understanding how to exploit networks to meet the customers’ needs. Moreover, systematic processes to evaluate partnerships and how to manage and develop a firm’s network relations were also highlighted.

4.2. Relational capability as integrative capabilities

The most evident manifestations of relational capability are cooperation structures and social interaction which were viewed as essential in organizations’ innovation activities. Here these are termed integrative capabilities (cf. Kohtamäki, Rabetino, and Möller 2018, 193). ‘Structural integration’ is associated with the aligning of processes and relational structures. The results show that appropriate organizing and optimizing of interaction structures, frequency and intensity are highly relevant activities.

Interviews with city representatives showed the presence of integrative capabilities in many structural forms. Cities have increasingly sought to develop new models to build innovation partnerships. For instance, public procurements of innovation demand systematic market dialogue processes where companies and in some cases also research partners, follow the process from the early formulation of real needs to providing innovative solutions. This has required the acquisition of new procurement and market know-how for city organizations related to bioeconomy. Cities have also opened data resources from their operations to support R&D and new service innovations related to bioeconomy. Interviews with representatives of RDAs revealed that, in general, interaction structures related to bioeconomy such as cluster groups are regarded as vital in knowledge sharing, aligning targets to support regional innovation activities and facilitating new R&D projects as well as promoting closer cooperation between research, business and government. In addition, procedures for the case- and problem-based organizing of expert teams from various organizations, when special expertise is needed, were regarded as a valuable capability among RDAs.

One form of structural integration was clearly visible in market-oriented steering and growing business life representation in REOs and RDAs’ boards and projects’ steering groups (see also Niinikoski et al. 2012). REOs have strengthened their brokerage function by engaging in structural integration with their partners to ensure the efficient use of

research information and to reach information users. These structures appear in various forms, such as long-term partnership agreements with some key companies and other partners. Collaborative funding of research and education programmes, with professorships and trainees being important forms of structural integration particularly with companies. Companies expressed the need for efficient processes and structural integration to exploit versatile external knowledge and expertise.

The second and very fundamental aspect in integrative capabilities is ‘social interaction and embeddedness’. The interviewees from all organization types highlighted a bundle of processes which relate to building relational capital in R&D activities related to bioeconomy, such as open interaction, trust, shared understanding, information sharing and overlapping knowledge bases which also make communicating easier (see also Martin 2013). For instance, RDAs stressed their deepening role as mediators between research and businesses and as facilitators of multilateral, boundary spanning development processes which engage various stakeholders.

Many interviewees underlined the need to strengthen their understanding and overlapping knowledge base in relation to the organizations they share R&D activities with. Versatile expertise and the background of the employees and their networks are clearly important resources in terms of integrative capabilities. Social interaction requires people (and their time) to delve deeper into the processes of other organizations. Interviewees showed that employees’ own cooperative relationships also have a significant impact on organization-level cooperation.

4.3. Relational capability intertwined with entrepreneurial orientation

Relational capability also manifests itself as being intertwined with entrepreneurial orientation and activities which facilitate organization and network level learning, development and innovation. These activities and processes are associated here with entrepreneurial efforts to harness the potential of the organization and its network to steer the development rather than the constraints set by the operating environment (cf. Rauch et al. 2009).

‘The exploration and assessment of new network ties’ is regarded as vital in all interviewed organizations. RDAs and REOs also emphasize the need to continuously seek new external funding for R&D activities with other partners. Interviewees highlighted the need to actively seek out the latest information and knowledge related to developments in the specific bioeconomy sectors and to constantly explore new potential resources and capabilities. These activities were linked to benchmarking and being part of ‘the right’ alliances and forums through which it is possible to find and connect to new potential resources and capabilities related to bioeconomy. This requires institutional links to and membership of the relevant networks and organizations, but also internal processing and the evaluation of external information in the organization (see Cohen and Levinthal 1990).

The second theme is regarded as ‘active efforts to mobilize external resources and reshape institutions’. Almost every interviewee referred, either directly or indirectly, to the capability to influence and use power over networks to promote one’s own and/or common agendas while challenging prevailing practices and institutions (cf. Benneworth 2007). These activities relate to strong personal and/or organizational social capital,

networks and status, but also to abilities to motivate, empower and inspire stakeholders (cf. Ebbekink and Lagendijk 2013, 747). Cities and RDAs engage in active lobbying to support their agendas and policy goals in bioeconomy. These organizations also actively promote and initiate new development processes to support innovation, for example, by launching cooperative projects and platforms which enable research, business and government to experiment with common themes related to bioeconomy. RDAs have taken an active role in promoting bold joint investments in development platforms, demonstration facilities etc. in cooperation with companies and REOs. Companies emphasize, in particular, the need to influence regulation (and funding) and facilitate new research or education areas in bioeconomy to support their business.

The third theme relates ‘to experimental risk-taking, co-creation and mutual learning’. The central ideas in all these activities are bold common or relation-specific investments and practices which enhance adaptation, learning and continuous improvement. Interviewees continuously emphasized the fact that complex problems and innovations in bioeconomy require cooperative activities to take and share the risk. Particularly in the early stages, innovation development demands joint platforms and facilities for co-development (see also Hämäläinen 2015).

For instance, one interviewed company is part of a cooperative formed by manufacturing industry and the Technical Research Centre of Finland. The aim of the cooperative is to design, manufacture, deliver and maintain large comprehensive system solutions for customers. This cooperative has given its alliance partners a better position to negotiate funding, maintain contacts with authorities and manage business risks. Moreover, many companies have invested in mutual learning with partners. This requires practices designed to promote continuous development and space for employees’ exploration of new ideas with partners. A couple of interviewees highlighted their company’s ability to facilitate learning processes by identifying and acquiring relevant knowledge and skills with their partners.

Interviewees from city organizations emphasized cities direct funding to REOs and other R&D organizations through their subsidiaries or holdings. Thus, they presented examples where they have made bold investments in innovation infrastructure and directed experimental funding from their budget to support a trial-and-error type of development in cooperation with other partners. Cities also make significant future investments in infrastructure, products and services and thus are actively involved in the development of bioeconomy ecosystems (e.g. energy production, waste recycling, etc.). RDAs emphasize the activities, such as the rapid testing of ideas with companies in R&D projects and the importance of strengthening their knowledge in experimental co-creation. REOs have also made major investments in education, R&D facilities and demonstration platforms in collaboration with companies and other partners.

4.4. Relational capabilities in different regional contexts of bioeconomy

Even though the main dimensions and themes of relational capabilities are very similar, regardless of the type of organization and regions, the practical manifestation and the purpose of these capabilities vary in different regional bioeconomy contexts.

In the Seinäjoki city-region, innovation activities related to bioeconomy in companies are often practice-oriented while a research unit for the development of new products or

processes does not necessarily exist. This emphasizes REOs' and intermediary organizations' role in the region in becoming active promoters of bioeconomy innovation networks. REOs in the region have strongly invested in the strengthening of relational capabilities and hands-on interaction, industry-related training and research, targeted R&D projects and longer-term partnerships and dialogue with companies in the food sector. For example, Seinäjoki University of Applied Science has been active in building partnership models for industry-related training, R&D infrastructure and also international education exports together with the local food industry. Companies note that they have actively participated in regional development working groups and project steering groups and thus look for new information related to bioeconomy. Companies have also built longer-term partnerships with the local university consortium to strengthen their knowledge, for example by funding professorships and research related to agro-bioeconomy in the region.

Correspondingly, the relatively lower R&D investments in bioeconomy companies in the Joensuu city-region are strongly reflected in the RDAs' role. RDAs have actively invested in developing relational capabilities, strengthening their know-how and recruiting new people to promote and facilitate multilateral bioeconomy R&D projects. The relational capabilities stand out in particular in the RDAs' efforts to coordinate the regional bioeconomy and to strengthen trust as a resource for cooperation between public and private sector actors and REO's. For instance, the vacancy of innovation director was established in the local business development agency, Business Joensuu, to coordinate regional R&D activities, to build more open innovation cooperation related to bioeconomy and to intensify business cooperation. Joensuun Yrityskiinteistöt Ltd., a real-estate company owned by Joensuu city, played an important role in building relational capabilities and a new kind of bioeconomy business park concept and a development platform, called GreenPark, which seeks to promote the customer companies' competitive advantage by providing a unique and fertile business park environment for business cooperation, joint energy solutions and material flow utilization.

In contrary, the significant 1.2 billion euro investment made by the Metsä Group in the Äänekoski in the vicinity of Jyväskylä, on a new bio-product mill provided impetus to the building of relational capabilities across all sectors. Thus, the potential for the development of new biomaterials, bioproducts and the exploitation of material flows has had a significant impact on the search for new partnerships between companies, universities and the public sector. The city of Jyväskylä and RDA's have actively sought to play a role in building new partnerships in the bioeconomy. RDA's have also established a regional foresight group consisting of various organizations in the region which have been used as an important forum to systematize joint foresight activities and partnerships for the production and sharing of new foresight data in bioeconomy sectors. In addition, the city has developed market dialogue processes with companies, for example, in increasing the use of biogas in local transport. The city of Jyväskylä has also launched experiments in resource-efficiency and in particular the development of biogas production and distribution together with biogas logistics, production and distribution companies and REO's in the region.

5. Discussion

The analysis highlights the role and importance of relational capabilities and suggests that the missing or poorly realized capabilities of economic actors to build, handle and exploit relationships and learn from these relations can hinder or slow innovation activities. The paper expands the literature on relational capabilities and organizational level studies by bringing a systemic context and understanding into the examination. Thus, this paper complements previous studies by looking at capabilities from the perspective of various organizations and by focusing on organizations and networks promoting the bioeconomy. This study supports previous findings on the role of relational capabilities in organizations' success (e.g. Kale and Singh 2007; Kohtamäki, Rabetino, and Möller 2018; Ritter and Gemünden 2003) as well the earlier observations on the systemic, multi-layered and embedded nature of these capabilities in regional renewal processes (Boschma 2017).

There are clear linkages and similarities between the findings concerning the role of relational capabilities in this study and those observed in previous studies. Firms, as well as other organizations engaging in innovation activities face new requirements and challenges with respect to collaboration and alliances. In the network economy, organizations, not only firms, must pay increasing attention to interacting with their environment (Ritter and Gemünden 2003; Rosenberg Hansen and Ferlie 2016). Relational capabilities play a crucial role in all studied organizations and organization types, though that role may vary depending on the organization and it may also evolve over time.

On the other hand, the results clearly support previous work suggesting that absent or underdeveloped capabilities may lead to other failures at the system level (see Weber and Rohracher 2012, 1045). Analysis suggests that there are a number of possible capabilities failures at play in attempting to facilitate innovation in a constellation of actors. The failures in relational capabilities may become particularly relevant in the bioeconomy context which embodies many systemic challenges, involves a great number of actors across different sectors and domains and requires the pooling of resources and the capabilities of various actors across the regional innovation system in order to facilitate innovation (cf. van Lancker, Wauters, and van Huylenbroeck 2016). All of the city-regions examined in this study have a strong resource and knowledge base from the bioeconomy perspective, but the data collected from different organizations highlights the importance of relational capabilities in the transition to a stronger knowledge- and innovation-driven bioeconomy. Particularly in smaller and institutionally thinner regions, relational capabilities are required to exploit the full potential of the region's bioeconomy and actively seek additional resources and capabilities from outside the region.

6. Conclusion

By elaborating further on the capability perspective and the conceptual framework for analysing relational capabilities this article has addressed the notion of relational capabilities in research, business and government cooperation and revealed their role in various organizations and in the systemic context of regions pursuing the transition towards a bioeconomy.

This study has both theoretical and practical implications. Based on theoretical discussion and empirical analysis the paper argues that the literature on organizational level capabilities and relational capabilities would benefit from deeper integration with the systems of innovation perspective. The study introduced a framework that helps us to understand and analyse the relational capabilities of the various organizations engaged in innovation activities. The paper suggests that ‘relational capabilities’ is a useful analytical concept that combines the micro-level foundations of the capability perspective with the meso-level systems of innovation (SI) approach. The conceptual framework and the synthesis of the previous literature together with the empirical findings expand the literature on relational capabilities and also open new avenues for studies that have called for a better understanding of capabilities and agency in regional economic renewal processes (see e.g. Boschma 2017; Isaksen et al. 2019).

The article highlighted the importance and embeddedness of relational capabilities in various organizations. Relational capabilities may boost the efficient use of an organization’s resources, bring greater flexibility and a chance to create value in networks, supporting renewal and innovation. The empirical findings reveal mechanisms through which relational capabilities appear in various organizations and contexts. The analysis showed that the main dimensions and themes of relational capabilities are very similar regardless of the type of organization, although the practical manifestation, the purpose and the needs vary between the organizations and contexts.

Overall, the findings also have implications for policymakers. The study underlines the importance of relational capabilities especially in terms of their contribution to enhancing systemic societal change. The article revealed that missing relational capabilities may hinder the transition towards a bioeconomy and hinder organizations from tapping into the economic opportunities that arise. This should be considered in the implementation of broad-based and mission-oriented innovation policy which aims to enhance systemic societal change. There is a clear need for long-term policy processes and instruments which also recognize, foster and develop the relational capabilities of various organizations in joint innovation activities and in the development of the knowledge-based bioeconomy.

As with all studies, various limitations should be noted. The contributions are limited by the context of the studied organizations and emphasize the innovation activities in the bioeconomy field which is highly dependent on public-sector activities. It is unlikely that relational capabilities are equally important for all organizations or that the implications for innovation policy are the same in all environments.

The future research agenda should however pay greater attention to the identification of agency and contribute to a fuller understanding of capabilities, their complementarity and tensions in networks (Grillitsch 2018; Laasonen and Kolehmainen 2017). A further study could also address and theorize in greater detail the ambiguous relationship between capabilities, value creation and performance in networks consisting of various organizations.

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Appendix

Table 1. Interviewed organizations in the Joensuu, Jyväskylä and Seinäjoki city-regions.

Type of organization	Covered organizations
CITIES (4) (Directors of development unit)	4 interviewees from city organizations
REGIONAL / BUSINESS DEVELOPMENT AGENCIES (13) (Directors of innovation and development units)	3 interviewees from centres for economic development, transport and the environment 5 interviewees from local city-owned business development agencies 3 interviewees from regional councils 1 interviewee from a rural business service and development agency 1 interviewee from an energy business service and development agency
RESEARCH & EDUCATION ORGANIZATIONS (10) (Directors of research institutes / R&D units / research teams)	3 interviewees from public research institutes 3 interviewees from universities 4 interviewees from universities of applied science
COMPANIES (13) (CEO's / R&D directors)	3 interviewees from large enterprises (> 250 Employees). Business areas: - Manufacturing of agricultural and forestry machinery - Energy production and distribution - Food production and processing and developing of renewable agricultural raw materials 4 interviewees from medium enterprises (< 250 Employees). Business areas: - Biogas technology - Goods transport - Food production - Agritech and manufacturing of agricultural machinery 4 interviewees from small enterprises (< 50 Employees). Business areas: - Manufacturing of natural fibre composite materials and products - Forestry information technology - Waste management - Food production 2 interviewees from micro enterprises (< 10 Employees). Business areas: - Organic waste management, energy and fertilizer production - Business services for food industry