

The Impact of Network Configurations on Value Constellations in Business Markets - The Case of an Innovation Network

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Abstract

A growing body of scholars are advocating a better understanding of how value is created in business networks, rather than merely in business relationships or at the level of single actors. Among such networks, innovation networks, i.e. the configurations of strategic entrepreneurial nets aimed at improving the effectiveness of innovation performance, have come under scrutiny in the business marketing literature. However, research that explicitly connects *value considerations* with *innovation network configurations* is still in its infancy, with empirical evidence being notably scarce. This study is aimed at identifying if and how network configurations affect value constellation aspects in business networks, in terms of value recipients and value outcomes. We interviewed key informants representing 46 high-technology entrepreneurial firms co-located in an innovation network (Daresbury Science and Technology Park - UK). Our study identifies that different network configurations can co-exist in the same overall network; these, nevertheless, are not alternative independent structures, but rather they interact with each other through actors spanning their boundaries. Our study thus provides an understanding of network configurations relating to specific value consequences, but also provides evidence relating to the interactions between different configurations. By doing this, we establish a bridge between a business marketing and a strategy perspective on value in networks. Important managerial implications and implications for policy makers also emerge from our study.

Keywords

Value constellations, network configurations, innovation network, Science and Technology Park

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1. Introduction

Over the past few decades research in marketing has followed two important and interrelated tendencies. The first is a growing focus on business relationships and the resulting business network structures rather than merely on market transactions, and the second is an increasing concern with the value of business relationships over and above the value of goods or services exchanged (Anderson, 1995; Grönroos, 1994). In business marketing, in particular, this shift in focus has been accompanied by the emergence and development of the concepts of ‘relationship value’ (Ulaga & Eggert, 2005; 2006) and ‘value networks’ (Jarillo, 1988, Parolini, 1999, Möller & Halinen, 1999). The notion of value is intuitively appealing to research in marketing (e.g. Ravald & Grönroos 1996; Pardo et al. 2006; Corsaro & Snehota, 2010; Grönroos, 2011) and the recent emphasis on value-in-use and value co-creation in the emerging Service-Dominant Logic (Ballantyne et al. 2011; Vargo & Lusch, 2004, 2011; Lusch & Vargo, 2008) has again put it at the centre of the contemporary research agenda in marketing.

Authors have adopted manifold perspectives in studying value, such as customer value (Flint et al. 2011; Menon et al., 2005; Sinha & DeSarbo, 1998), supplier value (Walter et al., 2001; Baxter & Matear, 2004), relationship value for the customer (Ford & Mc Dowell, 1999; Ulaga & Eggert, 2006), relationship value for supplier (Möller & Törrönen, 2003), relationship value for both parties (Henneberg et al., 2009; Payne et al., 2008; Hogan, 2001; Wilson, 2003), collective value (Pinnington & Scanlon, 2009), value in social context (Chandler & Vargo, 2011; Edvardsson et al., 2011), and many others; sometimes also introducing the time dimension and its effects on value (Eggert et al. 2006; Flint et al., 2002;

Beverland and Lockshin, 2003). As this shows, there has been enduring interest in value and buyer-supplier relationships over the past few decades (see Terpend et al., 2008).

However, studies have mainly tended to focus on value generated for focal companies or within the dyad (i.e. the direct relationship between two business partners). This is somewhat problematic as interactions unfolding between business partners who form a relationship generate consequences for the wider network (Håkansson et al., 2009). Thus, business marketing concepts need to develop to consider whole business networks as the amalgamation of individual relationships between business actors. “*One way to define markets is to view them as configurations of value creating elements in a network*” (Storbacka & Nenonen, 2011: 256) and therefore the impact of other contextual relationships (e.g. indirect ones) need to be considered, an aspect which has hitherto been somewhat neglected (Roseira et al., 2010). Circumstances external to focal dyadic relationships represent critical factors impacting on relationship performance and value, and such circumstances can be the level of interconnectedness among network entities, the number and strength of inter-firm ties, or the interaction among different relational performance drivers (Palmatier, 2008). Attempts to define such aspects of value in networks are still rare. Among them only a few studies are empirical (Hu & Tsai, 2007; Westerlund & Svahn, 2008; Cova & Salle, 2008), while most provide theoretical reflections (Gummesson, 2006, Lindgreen & Wynstra, 2005; Lusch & Vargo, 2008; Vargo & Lusch, 2004; Cova & Salle, 2008; Kothandaraman & Wilson, 2001; Sharma et al. 2001).

Business marketing studies on value in networks overlap with a parallel stream of research in the strategy literature: scholars have been increasingly concerned with shifting their analysis from value chains to value network configurations (Fjeldstad & Ketels, 2006). The concept of different ‘strategic nets’ or ‘network configurations’, i.e. distinct structures of business relationships, has been of particular interest (Norman & Ramirez, 1993, Stabell &

Fjeldstad, 1998; Pittaway et al. 2004; Gemünden et al., 1996; Achrol, 1997). Strategic nets are value creating systems where focal actors create value by configuring their portfolio of direct business relationships in a specific and integrated manner (Möller & Rajala, 2007; Möller et al., 2005). Such configurations have started to be linked to specific outcomes, mainly in terms of value co-creation, or resource combination and innovation (Möller & Rajala, 2007; Norman & Ramirez, 1993, Stabell & Fjeldstad, 1998); nevertheless, research on network configurations and network outcomes is still seen as preliminary (Möller & Rajala, 2007).

Summing up, in both the business marketing and the strategy field, research on value aspects and network configurations seems to be in an exploratory phase, and a comprehensive and detailed description of the processes and structures of value co-creation which characterize the strategic configuration of focal company's networks is still lacking. Also, studies in marketing have mostly adopted the individual actor as level of analysis, i.e. what is the value perceived by customers or suppliers, or the dyadic level, i.e. the dimensions that compose the value of a business relationship. At the same time, studies in the strategy literature tradition have been mainly concerned with value issues from a structural point of view, i.e. looking at configurations on the network level; it has been identified by Rampersad et al. (2010) that this represents a shortcoming as it neglects understanding the organizational, or inter-organizational (dyadic) level.

By adopting a multi-layer approach in this paper we attempt to overcome the existing limitations in the extant literature, and provide a comprehensive understanding of how value is created in business networks within a specific setting, i.e. a Science and Technology Park. Thus, the point of departure for this study relates to the paucity of conceptualisations and empirical evidence of the issue of value in business networks. In particular, our study explores the relationship between different network configurations and the characteristics of

associated value aspects (value constellations). In this study we will therefore address the following research questions: Do network configurations affect value constellation aspects in business networks? How do such network configurations differ from each other, e.g. in terms of structures, and in terms of value aspects? In our specific case, in order to delineate *network configurations*, we will use the strategic nets of entrepreneurial companies situated in an innovation network, namely Daresbury Science and Technology Park (UK), while we will conceptualise *value constellations* as different value outcomes for different value recipients in these strategic net.

Our research is carried out in the context of most product-based firms linked to innovation activities as exemplified by the network associated with the Daresbury Science and Technology Park (STP). Specifically, we report findings from a study of 46 high-tech entrepreneurial firms, which are co-located in the STP and represent the total population of Daresbury. Our different case studies include qualitative data (in-depth interviews and cognitive map eliciting techniques) from key informants in these firms, as well as their customers, suppliers or partner institutions, plus the STP management team. We draw on three different network constellations (termed seekers, believers and doubters) which characterize the specific network configurations of the focal entrepreneurial firms in the STP (Ramos et al., 2010). In this context value is observed in terms of value outcomes on three relevant levels of analysis: the focal entrepreneurial company in the STP (single actor level), the relationships between the focal company and its interaction partners (dyadic level), and with other companies in the STP as well as the STP network management (network level).

The articles progresses as follows: Section 1 discusses network configurations, with particular reference to innovation contexts. Section 2 reviews the literature on value and Section 3 integrates the framework on network configurations and value constellations. The

methodology is presented in Section 4 and the main findings in Section 5. Conclusions are discussed in Section 6 and implications for theory and practice follow in Section 7.

2. Network Configurations in Innovation Contexts

2.1. Understanding network configurations

In our study, network configurations will be used to categorize the strategic nets of different actors within the case study of the STP (i.e. an innovation network), and to analyse how different network configurations affect the resulting value constellations. Previous research shows how companies interact to exchange and mobilize resources with and from other companies for various reasons (Anderson et al., 1994; Grandori & Soda, 1995; Håkansson & Turnbull, 1982; Ritter & Gemünden, 2003). As Ritter and Gemünden (2003) put it, “*interorganizational relationships are seen as long-term oriented arrangements between organisations (firms, institutions, agencies, etc.)... [which] fulfil various functions [...] and create value*” (2003: 745). According to the resource-dependency theory (Pfeffer & Salancik, 1978), companies interact mainly as a means to get access to other’s resources that are required for the development of their own business activity (Baraldi & Strömsten, 2006; Ford et al., 1998). However, regardless of the advantages of business relationships, these cannot be understood in an isolated way (Håkansson & Snehota, 1989); instead, companies are embedded in a complex networks of interdependent relationships which form a web of interactions, i.e. a network (Håkansson et al., 2010; Waluszewski et al., 2008).

This idea of adopting a network approach emerged in the early 90s with research by the IMP (Industrial Marketing and Purchasing) Group (Axelsson & Easton, 1992; Håkansson & Johanson, 1992), and is congruent with the notion that a new economic context has emerged over the last three decades (Parolini, 1999; Ritter & Gemünden, 2003; Sweet, 2000). Specifically with regard to entrepreneurship (the context for our study in STPs), the extant

literature identifies several reasons for companies to engage in networks, related to distinct innovation networking benefits. It is through strategic activities, i.e. ‘networking’ (Ford et al., 2003), that companies access (complementary) information, markets, and technologies (i.e. technical and/or commercial resources and capabilities) which they require to innovate (Afuah, 2000; Bower, 1993; Ostgaard & Birley, 1996; Powell et al., 1999). Moreover, by cooperating and exchanging information with others, companies build a substantial knowledge base and are able to get involved in future exchange relationships (Ahuja, 2000; Shaw, 1998). Networking also enhances learning opportunities (Biemans, 1991). However, while the importance of inter-organizational collaboration and involvement in networks is widely discussed and recognized, the extant literature has identified the issue of the association between different network configurations on the one hand, and network outcomes in terms of value on the other as an important further research topic (Baraldi & Strömsten, 2006; Pittaway et al., 2004).

Several definitions of network configuration can be found in the literature; according to Perks and Jeffery (2006: 70), “*network configuration [...] is conceptualised as the shaping and management of the firm’s position in a network in order to access and mobilise critical knowledge*”. While this definition conflates the concepts of ‘networking’ and ‘network position’ (Ford et al., 2003), Gemünden et al. (1996) focus on two dimensions of network configurations: pattern (i.e. importance played by the collaboration with partners of a specific nature – e.g. universities, co-suppliers, distributors, research and training institutes), and intensity (i.e. how often or how strong is the interaction with a specific partner). These two dimensions are very close to the notion of network structure or network composition (Phelps, 2010). Whilst Perks and Jeffery’s (2006) definition centres on the purposes of the focal actor’s configuration activities, the structural or morphological aspect of the network is more central in Gemünden et al.’s (1996) definition. Both aspects are included in the discussion by

Pittaway et al. (2004), who talk about network configurations as “*the make-up of networks and how these can be formed to benefit strategic goals*” (: 143).

All these definitions adopt a focal actor or ‘orchestrated’ network perspective (Doz et al., 2000; Hinterhuber, 2002), instead of a collective or emergent one (Conway, 1995). Our study similarly employs such a focal actor-defined perspective, in line with understanding network configurations as a *strategic net*: a focal actor who tries to configure the immediate network (i.e. its strategic net of especially direct relationships) through networking activities (Jarillo, 1988; Möller et al., 2005; Ostgaard & Birley, 1994). We therefore adopt a definition of the concept of network configuration incorporating the structure of the strategic net of a focal actor with regard to its patterns and intensity of relationships with other actors, as well the focal actor’s positioning and (strategic) configuring activities (Hinterhuber, 2002; Kash & Rycroft, 2002; Madhavan et al., 1998). This is similar to Samaddar et al. (2006) who define supply network configurations by their network patterns, the location of the focal firm in the network, and the coordination structure that is activated to manage inter-organizational relationships whilst considering partners’ goal congruence.

2.2. Networks and networking for innovation

Innovation is acknowledged by practitioners, policy makers and academics as a vital element for (most) companies and nations’ competitiveness and growth (OECD, 2005; Stock et al., 2002). Innovation is also identified by researchers as one of the main motivations for companies to collaborate (Fischer & Varga, 2002), and to be involved in inter-organisational relationships (Gulati et al., 2000; Pittaway et al., 2004; Ritter & Gemunden, 2003). Increasingly, a company’s capacity to innovate is perceived as being dependent not on its own internal capabilities and resources, but instead on its capacity to integrate and to mobilize (i.e. get access to) resources that lay beyond organizational boundaries and even beyond their direct relationships somewhere in the innovation network (Afuah, 2000; Möller et al., 2005;

Perks & Jeffery, 2006). Companies therefore exhibit gradually higher levels of interdependence, resulting from increased underlying external collaboration for innovation (Teece & Pisano, 1989; Tidd et al. 1997).

The extant literature identifies several reasons for companies to engage in networks for fostering innovation, related to distinct innovation networking benefits. To begin with, it is through strategic marketing activities (i.e. ‘networking’, Ford et al., 2003) that companies access the (complementary) information, markets, and technologies (i.e. technical and/or commercial resources and capabilities) they require to innovate (Afuah, 2000; Bower, 1993; Ostgaard & Birley, 1996; Powell et al., 1999). Pittaway et al. (2004) add to this discussion through a revision of the literature on networking and innovation, documenting the importance of networking in fostering innovation across and within firms. More specifically, Pittaway et al. (2004) identify the following innovation benefits resulting from networking: *“risk sharing; obtaining access to new markets and technologies; speeding products to market; pooling complementary skills; safeguarding property rights when complete or contingent contracts are not possible; and acting as a key vehicle for obtaining access to external knowledge”* (p. 137).

Previous work provides some evidence on how different network configurations are associated with different levels of ‘success’ or innovation outcomes (Phelps, 2010): for example, specific configurations, namely characterised by different patterns and intensity of relationships, can be associated with different levels of product and process innovation success (Bower, 1993; Gemünden et al., 1996); different configurations have also been found to generate different levels of capabilities for the focal company, as well as different levels of access and control over innovation related knowledge (Perks and Jeffery, 2006). It is found that partner types (e.g. customers, universities) and their characteristics (e.g. depth of technological resources) condition the nature of the innovation activities (e.g. exploratory,

radical or incremental innovation) (Baum et al., 2000; Biemens, 1991; Kash & Rycroft, 2002; Phelps, 2010); and more tightly coupled network structures (Weick & Roberts, 1993) affect information and thus innovation diffusion (Coleman, 1988). Previous work also illustrates how the network complexity conditions inter-organizational information sharing, which in turn affects organizational performance (Samaddar et al., 2006). The number of collaborative relationships (Phelps, 2010; Shan et al., 1994), as well as the 'closeness' to the focal and controlling actor (Brass & Burkhardt, 1992) are other constructs mentioned. Overall, structural aspect of networks are discussed as a key determinant or at least a moderating factor for innovation performance, and the efforts carried out by managers to configure their strategic net according to certain goals is important for understanding innovation outcomes (Kash & Rycroft, 2002; Madhavan et al., 1998; Storbacka & Nenonen, 2011).

The value of networks and networking for innovation activities presented so far refers mostly to the opportunity to create in-house innovation. However, networking promotes the diffusion of innovations within and across different sectors (Almeida & Kogut, 1997; Nooteboom, 2000). Networking is also described as a solution to overcome some problems underlying companies' involvement in (product and process) innovation development, an activity which becomes increasingly more difficult as a result of shorter innovation cycles, increasing complexity of technologies, and growing costs of innovation. Networking is perceived as a route to mitigate these innovations (Ritter & Gemunden, 2003).

However, regardless of the innovation value that results from inter-organizational collaboration, business networks also pose some disadvantages for innovation activities (Perks & Jeffery, 2006). For example, collaboration may cause product development to become more costly, complex and hard to manage (Bruce et al., 1995). Furthermore, there exist the risk of giving away core capabilities or proprietary knowledge, or even of losing control over an innovation (Lorange & Roos, 1991), e.g. as a result of disclosing strategic

information to business partners (Bruce et al., 1995; Prahalad & Hamel, 1990). Other aspects of inter-firm conflict have also been discussed in the literature as possible causes for a innovation networks to 'fail' (Bower, 1993; Pittaway et al., 2004).

3. Understanding Value Constellations

3.1. Towards a networked idea of value

In marketing studies value is a central concept, being considered the main basis of all marketing activities; value creation and sharing is often posited as the main goal of a supplier and customer within a business relationship (Anderson, 1995; Wilson, 1995; Grönroos, 1994). However, for a long time studies on value have focused on the value of tangible goods, leaving out relationship dimensions (Dwyer & Tanner, 2002). More recently, a change in the research focus can be observed: from a central attention on exchanges of tangible materials for manufacturing, to a broader focus on collaborative partnerships, relationships, wider networks, different aspects of value, and value constellations (Bovet & Martha, 2000; Hoyt & Huq, 2000; Gunasekaran & Ngai, 2005; Spekman et al., 1998).

Shifting from a product logic to a relationship logic, studies on value are enriched by a series of new ideas and considerations. The value creating process is not limited anymore to individual focal companies, and not even to dyadic interactions, instead taking place through interactions in complex networks (Ballantyne & Varey, 2006; Cova & Salle, 2008; Gummesson, 2008; Grönroos & Ravald, 2011); value is not determined only by the customer, nor only from interactions in dyads of customers and suppliers, but is instead created through several intermeshed interdependencies which work simultaneously (Baraldi & Wedin, 2005; Storbacka & Nenonen, 2011). In this context an important role has been played by studies of Nordic origin in the sphere of the IMP Group (Håkansson & Snehota, 1995), which go beyond the logic based strictly on products, its features, and the benefits derived from use of

them (always taking into account the relevant sacrifices for owning, obtaining, or using this product), but focus on the business relationship and on the consequences of interactions, both on dyadic and on network level.

The Service Dominant Logic (SDL) of marketing has also recently emphasized the link between value, interactions, and networks (Vargo & Lusch, 2004; Lusch et al., 2010): “A *value network is a spontaneously sensing and responding spatial and temporal structure of largely loosely coupled value proposing social and economic actors interacting through institutions and technology, to co-produce service offerings, exchange service offerings, and co-create value*” (Lusch et al., 2010: 20). Also, Gummesson (2008: 16) argues that “*service is created in a network of activities involving a host of stakeholders*” and Normann (2001) defines a service system as both a provider and client of service that is connected by value propositions in value networks or value-creating systems. Similarly, Cova and Salle (2008) propose an approach to co-create value in customer networks based on a switch from customer value proposition to customer network value proposition; they assume that value is co-created not only between customers and suppliers but that the organization’s partners throughout the network also take part in the process.

3.2. Network configurations and value considerations

In order to develop further the networked idea of value, the concept of network configurations can be linked to issues of value, thereby defining value constellations. In this context we will also discuss how such issues have been treated in the strategy literature compared to business marketing studies, as represented by the IMP Group’s research. However, besides more generic linkages between network configurations and network outcomes, specific empirical studies on the impact of network configurations on issues around value are rare (Parolini, 1999; Stabell & Fjeldstad, 1998; Storbacka & Nenonen, 2011).

Adopting a value-chain logic (Porter, 1990), value is added only by moving from suppliers in upstream industries to buyers of products and service; value creation and appropriation is analysed at the firm level. Moving to the network level, value is no longer created (solely) along a value chain; concepts of value networks, in fact, allow for a more holistic and detailed understanding of the phenomenon (Fjeldstad & Ketels, 2006) and represent the context for the creation and appropriation of value more appropriately than traditional concepts (Ehret, 2004). The value networks, or value constellations, have been defined as inter-organizational networks linking firms with different assets and competences together in response to or anticipation of new market opportunities (Normann & Ramirez, 1993). Value constellations imply rethinking value creation not from a single point of view but as the outcome of the interplay of network partners (Vanhaverbeke & Cloodt, 2006), thus, focusing on value *co*-creation. What value constellation and value chain structures have in common is that they are both aimed at delivering value for target customers; however, while value chain concepts posit that value is added gradually and sequentially, in value constellations conceptualizations value is (re)invented by means of reconfiguring companies roles and relationships (Vanhaverbeke & Cloodt, 2006). Compared to a value chain, competitive advantage is no longer determined at the firm level, but at the constellation level (Gomes-Casseres, 1994).

Normann and Ramirez (1993) also shed some light on the complexity of both vertical and horizontal alliances compared to the simplicity of the (sequential) value chain. By using a ‘value creating system’ perspective, the set of performed activities is responsible for the (co)creation of value; economic players are no longer the elementary unit of strategic analysis, but their embeddedness in a specific configuration becomes pivotal. These new considerations had a significant impact on the configuration of industries, as well as on companies’ behavior, and most importantly on the underlying value *co*-creation logic of the

networks (Normann & Ramirez, 1993; Parolini, 1999; Stabell & Fjeldstad, 1998). Consequently, value network concepts can therefore also be used as a tool to diagnose a company's strategic competence (Johnson et al., 2009).

Scholars have attempted to identify the different value structures characterizing business networks. Möller and Rajala (2007) and Möller et al. (2005) categorize three value configurations, namely 'current business nets', 'business reward nets' and 'emerging new business nets', defined according to the focal actor's goal, and the structure of the business net. With a 'current business net', value is created by providing customers with integrated offers which result from combining complimentary resources in an efficient way; on the other hand, the value logic underlying a 'business renewal net' is that of providing customers with specific solutions, and renewal of current offering and business processes. Finally, with a 'new business net', value creation results from the firm's capability to create new dominant technologies, as well as to dictate the directions of rising fields (Möller et al., 2005).

Stabell and Fjeldstad (1998) put forward a value configuration analysis, a strategic tool which aims at understanding value creation and firm competitive advantage from a strategic perspective. The authors identify three possible value configurations are (i.e. value chain, value shops, and value network), each being associated with specific technology typologies, differently coupled systems, and thus with specific sectors (Fjeldstad et al., 2004; Fjeldstad & Ketels, 2006). With the value chain, value is created by (efficiently) supplying a product; with the value shop the value creation logic depends on the capacity to (effectively) provide a solution to specific problems; and finally, in a value network configuration, value is provided by facilitating access to other parties in an effective and also efficient way (reflecting the need to scale up the network, and thus the relevance of network size and network composition) (Fjeldstad et al., 2004; Fjeldstad & Ketels, 2006). However, most value creating systems are argued to be hybrids, i.e. they include firms which represent all three

value creation logics (Harris & Burgman, 2005). Such co-existence of different organizations following different value creation processes may be problematic, as it represents additional complexity and thus a managerial challenge for those involved, an issue further complicated by partnership or M&A arrangements (Borys & Jemison, 1989; Powell, 1987). Based on such a hybrid logic, Bititci et al. (2004) identify different levels of collaborative enterprise models according to the level of collaboration and the value transactions characterizing them: they are supply chains, extended and virtual enterprises, and clusters.

In summary, in the strategy literature value creating networks emerge from firms that come together to create customer value (Kothandaraman & Wilson, 2001), where networks are seen as intentionally created by firms with key partners who can add value to market offering. In strategic nets on the other hand (Jarillo, 1988, Parolini, 1999, Möller & Halinen, 1999), the management of a focal company deliberately creates business interactions with especially direct exchange partners in order to generate value and mobilize resources. This corresponds to a voluntaristic view, according to which a company can create and shape its surrounding network in order to accomplish its strategic aims; this contrasts with a more deterministic and structuralist perspective where a company is embedded in a network which it cannot control or shape (Gilsing et al., 2007). The notion of strategic net is partially overlapping with how value is conceptualized in business networks in IMP research (Håkansson, 1982; Håkansson & Snehota, 1995). The two streams of research share the idea that value is co-produced by actors who interact with each other in complex structures called networks (value networks or value constellations), but with a crucial difference: according to the IMP Group's scholars networks are not intentional structures as interdependencies between actors make it impossible to exert complete control over relationships or thus over the network (thus, following a structuralist perspective). Actors both affect network dynamics, and they are outcomes of them (Håkansson & Snehota, 1995). In the strategy

literature, instead, actors can manage the value constellations and foster their development according to their aims by making use of their relational capabilities, i.e. the capability to interact with the others in the value network (Dyer & Hatch, 2006). In addition, the value constellation idea as developed by Normann and Ramirez (1993) has a more positive connotation than as in the IMP, where relationship and networks are at the origin of many benefits, but also of difficulties and problems. As our research uses focal strategic nets as a core construct, we thus follow a voluntaristic perspective (Gilsing et al., 2007).

Among the IMP scholars that studied value vis-à-vis different network configurations, Baraldi and Strömsten (2006), drawing on the principle that resources are both the source and the tool for value creation, explore the idea that value co-creation is associated with the configurations of resource interfaces (Hu & Tsai, 2007), and that value co-creation includes two processes connected with these configurations, namely value embedding (i.e. new resource combinations), and value production/utilization (i.e. routine resource combinations). This analysis therefore qualifies Stabell and Fjeldstad's (1998) proposed typology by showing how different configurations are not specific to industries; instead, "*value emerges within networks that span and connect several industries*" (Baraldi & Strömsten, 2006: 67). Their research is also congruent with Storbacka and Nenonen's (2011) view of value co-creation and network configurations who describe markets as "*interdependent elements that increase the density of resources for the participating actors.*" More generally, given the recognized and widely discussed importance of inter-organizational collaboration, and involvement in innovation networks, the extant literature has identified the issue of the association between different network configurations on the one hand, and outcomes in terms of value on the other as an important further research topic (Baraldi & Strömsten, 2006; Pittaway et al., 2004).

Research on network configurations and value, in fact, does not converge on a consensus about what network configuration features lead to a better performance, i.e.

specific value outcomes. For the purpose of our study, we will therefore develop a specific value constellation operationalization as the dependent variable, which we then relate to network configurations as the independent variable.

4. Methodology

4.1. Research setting

In order to analyze the relationship between network configurations and value constellations, an innovation network - Daresbury Science and Technology Park (Daresbury for short) was chosen. This STP was established in 2006 and includes 46 small high-tech entrepreneurial firms co-located in a dedicated building in the North-West of Great Britain. Daresbury was established with the specific aim of providing an environment based around knowledge sharing, collaboration and networking.

More in general an STP is defined as “*a property based activity which is configured around the following: formal operational links with a university or other higher educational or research institution, the formation and growth of knowledge based business and other organization on site, and a managerial function that is actively engaged in the transfer of technology and business skills to the organizations on site.*” (Tan, 2006: 828). Different actors can be simultaneously present in STPs, namely companies, universities, research centres, governmental agency, the STP’ management company, specialized services offices, etc. Amongst these entities, Universities in particular play a critical role by capturing multiple reciprocal relationships among institutional settings (public, private, and academic) at different stages in the ‘capitalization of knowledge’ (Etzkowitz & Leydesdorff, 2000). In the case of Daresbury, the activity of the STP is closely associated with the universities of Manchester, Liverpool, and Lancaster.

STPs offer a wide range of services, such as real estate services (i.e. rental of offices and conference centre), support services (e.g. training of staff), services to management (selection of projects, legal advice, consulting in marketing, etc.), services to funding innovation (assistance in the bureaucracy and the presentation of applications, partnership with private banks or venture capital), and incubation services for new businesses (research facilities and promotion of information sharing with innovative companies in the same sector). STPs also provide partnership and networking services by facilitating the establishment amongst all (national and international) actors involved in the process of innovation and reorganization of the territory, mainly research community, industry and local government.

4.2. Construct operationalization (independent variable): network configuration

Before the empirical phase of the research is discussed, the different focal constructs of network configurations on the one hand, and value constellations on the other, need to be detailed further. Value constellations as the dependent construct will be analyzed for different *network configurations*. As the used concept of network configurations is made up of three distinct types, three analyses of value constellations are provided, one for each configuration type, specifying how each is characterized in terms of actor bonds, activity links and resource ties according to the AAR model (Håkansson & Snehota, 1995). The tripartite distinction of network configurations, i.e. strategic nets of focal entrepreneurial companies residing in the innovation network, is based on Ramos et al. (2010): Their analysis distinguishes between the strategic nets of doubters, seekers, and believers. These strategic nets are characterized by interactions of the focal company with different interaction partners; these can be companies (e.g. as customers or suppliers) but also other organizations such as universities).

Doubters exhibit a strategic net configuration which is virtually independent of the structure of the STP. They are not looking for sophisticated benefits from the STP location, or

resources embedded in the actors or activities available. These doubter companies mainly have actor ties within established supply and demand chains outside the STP network, and do not depend on any resources of (and do not contribute resources to) the STP or its member companies. Cost and convenience as well as reputational characteristics of the STP itself drive their choice, but they usually enter the STP with an established strategic net already in place (often through previous entrepreneurial activities) (Ramos et al., 2010).

Seekers are much more embedded in the STP than Doubters, and they typically have far more internal links to external resource ties than doubters. They also engage in internal activities, e.g. joint technological developments with other STP companies. However, they still retain very well established resource ties and activity links with outside companies, both for supply and selling purposes. It is noteworthy that Seekers mobilize crucial resources both through their STP internal as well as external strategic net. Therefore, they provide a crucial link function between the STP, other STP companies, and their established wider networks. One resource characteristic is linked to mobilizing external resources of other STP companies through networking activities. For example, several entrepreneurial companies, although working in different industries, face the same kind of challenges, e.g. with regard to intellectual property issues. Thus, seekers use internal activities with other STP companies to get in touch with external IP knowledge specialists. Consequently, through STP internal actor bonds, new external resources ties are formed (Ramos et al., 2010).

Believers are committed to the STP; they do not have many actor or activity links outside the confines of the STP, and they are provided with their crucial resources from within the STP: In extreme cases, these companies reside totally within the STP, i.e. their strategic net becomes the relevant embedding network context for them. Believers are totally dependent on the STP and its members as they often have their supply chain as well as their immediate customers within the STP. Furthermore, they also mobilize crucial resources (e.g.

knowledge or even personnel) via collaboration activities with other STP companies. Often, their activities in terms of instigating networking activities resemble those of the STP management, i.e. they become an alternative managerial resource for the STP: Therefore, believers search out a STP with important characteristics for their prospective business, and their performance is crucially dependent on the characteristics of the STP and of the STP companies (Ramos et al., 2010). Table 1 summarizes the characteristics of the different network configurations.

Network Configuration

	Believers	Seekers	Doubters
Actors	* A significant number are internal to the science park	* Actor links are a combination of both internal and external to the science park	* Those internal to the science park play no role in adding value
Activities	* A significant number are internal to the science park. These may be either revenue generating (sales to other companies) or may be joint technology development for mutual gain	* Activities are a combination of internal and external. Internal activity links tend to focus either on joint technology development, or else access to funding and/or professional services (law, accounting, etc.)	* Typified by there being almost no meaningful internal activity links
Resources	* The greatest reason for the choice of location is access to the resources of the others entrepreneurs.	* Resource ties are equally split between internal and external partners.	* Almost no resource ties with other internal players.

Table 1: Description of Characteristics of Different Network Configurations in an STP (Ramos et al., 2010).

4.3. Construct operationalization (dependent variable): value constellation

The aim of this study is to understand if and how certain network configurations (as the independent construct) can be related to specific aspects of value, particularly *value constellations* (the dependent construct). Such constellations are operationalized in terms of *value outcomes* in business networks, as well as *value recipients*, representing different value levels (e.g. those of individual actors, relationships as well as networks).

4.3.1. Value recipients

In order to understand value aspects in business networks regarding different value recipients, the three levels of the actors, relationships, and network need to be considered (Håkansson & Snehota, 1995).

The question of value is particularly prominent for the *actor perspective*, “*market actors are engaged in market-creation activities: building network positions, attempting to create exchange, and influencing other actors in the market (potential customers, providers, and competitors) to start to view the suggested market configurations as an attractive source of resources for their future value creation*” (Storbacka & Nenonen, 2011: 259). When perceived value increases for an actor, his/her satisfaction increases as well, thus increasing the probability to stabilize a relationship. The maintenance of the relationship over time depends on both parties value expectations being met (Pinnington & Scanlon, 2009). This leads to an increase in customer/supplier equity and, as a consequence, in the value of the relationship for the company (Lichtenhal et al., 1997). The relevance of actors in value co-creation has also been discussed by Lusch and Vargo (2008: 7), according to whom “*value is always uniquely and phenomenologically determined by the beneficiary*”. The consequence is that value in use arises from the consumption, judgment and confirmation made by the customer in the marketplace (Ballantyne & Varey, 2006; Vargo & Lusch, 2004).

The actor level regarding value is directly linked to the *relationship perspective*: Biggemann and Buttle (2005) identify four types of relationship outcomes contributing to relationship value generation: personal value (customer retention, referral), financial value (efficiency, share of business, share of market, pay more), knowledge value (market intelligence, idea generation, innovation) and strategic value (long-term planning, extended network). Ritter (2000) identified seven types of derived relationship value among organizations, consisting of system selling, combination advantages, exclusive rights, mediation, competition, lobbyism and surety. On the supplier side, both benefits and

sacrifices can be related to the relationship as well as to the connected relationships, which can have an impact on the focal relationship (Roseira et al., 2010). Value is therefore a direct and indirect function of the relationships; direct functions include those value-related effects which are independent from other relationships, while the indirect functions capture effects related to the future of the focal relationship as well effect related to other relationships in the wider business network (Walter et al., 2001). For the purpose of our analysis, we define the scope of the relationship perspective to pertain to interactions of the focal entrepreneurial company with other commercial companies, as well as the STP management. We do not explicitly include further interactions, e.g. with universities, government organizations, as these were not significantly represented in our data set.

However, the value generated from such inter-firm relationships derives not only from the quality of actor ties (e.g., trust, commitment, relational norms), but also from the decision-making capability of inter-firm contacts and the interactions among relational drivers (Palmatier, 2008), thus introducing a *network perspective*. Hu and Tsai (2007) classify value consequences in networks in terms of unilateral or bilateral effects, and network types as open or closed circuit systems. Applying these two dimensions the authors define four generic network models of value-derived effects: unilateral open type, unilateral circuit type, bilateral open type, bilateral circuit type. Ford and McDowell (1999) also analyzed the value outcomes in terms of value of different actions by referring to four levels of analysis: effects in the relationship (value as immediate), on the relationship (value in terms of change to the state of the relationship), on the relationship portfolio (value in terms of change in the total relationship portfolio), and within the network (value in terms of change in the network).

The three levels of value considerations described are obviously interrelated as the way firms in a network combine to create value is fundamentally influenced by the nature of the relationships that firms have with each other (Kothandaraman & Wilson, 2001) and

which, in turn, depend on the specific behaviors of individuals.

When applied to the Daresbury STP case, the level of *single actor* as value recipient refers to an entrepreneurial high-tech company which is located in the STP. Any strategic net (i.e. network configuration) analyzed is anchored in such a focal company. Value recipients on *dyadic* level refer to value aspects of the strategic net, i.e. is related to the relationships that the focal entrepreneurial company has with other actors of its strategic net. These other actors maybe other entrepreneurial companies within the STP, the STP management, or outside commercial actors. The *network* level of the analysis captures value aspects for all other entrepreneurial companies within the STP innovation network, and value aspects for the STP management. Thus, four different types of value recipients are presented on three levels: the focal company (single actor level), the strategic net of the focal company (dyadic level), other companies in the STP network, and the STP network management (both related to the network level).

In the next section we connect the three levels of value recipients with value outcomes and identify a specific analytical framework to catch the complexity of value aspects with respect to the three network configurations previously defined

4.3.2. Value outcomes and a proposed analytical framework for value constellations

The construct of value outcomes utilizes the concepts of rationalization versus development functions (see Gadde & Håkansson, 2001; Håkansson & Persson, 2004), a distinction that captures the different orientations that a relationship can assume in terms of outcomes. The same distinction has been also used by Ford et al. (2003) who classify relationship outcomes into two types: the first is related to what is accomplished in the relationship – its effectiveness -, and the second is concerned with how well the processes works within the relationship - its efficiency. The rationalization function covers aspects of efficiency, while the developmental function captures effectiveness issues. Obviously, the

intensity of these two effects is variable (Håkansson & Snehota, 1995). Thus, value outcomes are classified according to the type of effect they generated. Broadly, the rationalization role refers to cost efficiency, for example achieved by simplification of administrative routines, the saving of relational costs (contact/negotiation/contract), the rationalization of the logistic function, or the reduction of delivery times. The developmental role can be exemplified by identification and acquisition of new technological solutions, product and process innovations, processes of customization of the offering, time-to-market reduction, and access to preferential distribution channels, among others. Value outcomes of a business relationship for a company can therefore be qualified in terms of cost efficiency (technical/operational) and/or in terms of effectiveness (innovation and development), as well as the associated sacrifices of these benefits.

Table 2 thus describes the analytical framework as well as specific value aspects which can be generally associated with the different value constellations. It uses the proposed three levels of value recipients, and the two levels of value outcomes to describe any value constellation. This general framework was pre-tested on a group of 5 customers and 5 suppliers in an entrepreneurial setting within the IT (Information Technology) Industry to test whether it appropriately captures value aspects. Following from this, the analytical framework was then used in the Daresbury case study to describe the value constellations of each of the three network configurations as found in the empirical case data.

Value Recipients	Value Outcomes	
	Rationalization (efficiency) effects	Development (effectiveness) effects
Single actor	<ul style="list-style-type: none"> - Better exploitation of existing resources - Rationalization of internal processes - New organizational structure - Reduction in waste - Economization of materials - Improvement of technical efficiency 	<ul style="list-style-type: none"> - Improvement in corporate image - Increase in the number and value of patents - Increase in the company know-how - Sustainable development of the firm

Dyad	<ul style="list-style-type: none"> - Reduction in transaction and exchange costs - Personal interaction becomes more fluid - Reduction in conflict costs - Improvement of routines in the relationship - Reducing costs of contact - Improve process efficiency in the relationship 	<ul style="list-style-type: none"> - New product development through collaboration - Know-how transfer between parties - Improvement of the interlocutors' reputation - Improvement of the relationship image - Improvement of product/service quality - Increasing capacity to response to counterpart requests
Network	<ul style="list-style-type: none"> - Rationalization of the relationship portfolio - Better use of existing relationships as bridges toward third parties - Improvement of the inter-operability between third parties technologies - Increase resources sharing with other actors - Reduced coordination costs - Reduced counterparts' searching costs 	<ul style="list-style-type: none"> - Scouting of new information in the network - Establishment of new relationships with third parties - Creation of synergies in the relationship portfolio - Improvements of the strategic positioning - Access to new resources

Table 2: An Analytical Framework of Value Constellations in Business Networks (including examples of values aspects in terms of outcomes and recipients)

4.4. Data collection and analysis

We use a social constructionist approach based on empirical data which is made up of repeated face-to-face interviews with 46 entrepreneurs or senior managers at Daresbury. Using such high-level informants ensured that, while employing a qualitative and subjective data collection technique, we captured the best-informed understanding of the strategic decision-makers in each organization. Several entrepreneurial companies in the STP were owned or managed by the same owner or CEO, thus, we covered all focal actors in the innovation network of Daresbury. As our analysis refers to strategic nets anchored in focal entrepreneurial companies, this provided us with 46 individual cases for analysis. As such, this study follows the ‘innovative practice’ approach to case analysis by including a full network sample within the Daresbury STP network (Piekkari et al., 2010). By using the Daresbury STP to choose the case studies, we address the issue of network boundaries (intranet perspective) as well as of case comparison (as all cases share the same context). Furthermore, by using the focal construct of strategic nets, we limit the possible network complexity involved in each case (Halinen & Törnroos, 2005).

The companies had between 5 and 20 employees and were all in the pre-trading phase (with a small number post-trading, i.e. in their first year of actually selling an offering in the wider market). All respondents were senior managers (either entrepreneurs/owners or director). Interviews were between 1 and 2 hours long. We also interviewed the STP management (three managers). We used semi-structured interviews and the network picture methodology (Henneberg et al., 2010; Ramos & Ford, 2011), as combined pictorial and textual data gathering technique is often used in business network analyses (Ford et al., 2003; Ramos et al., 2005). As part of this exercise, we asked respondents draw their network pictures, and to explain their own company's position within the wider STP network, as well as to explain their reasons for choosing that specific STP. This methodology allowed us to categorize each of the entrepreneurial companies according to the network configurations proposed in Ramos et al. (2010). Furthermore, in a second part of the interviews, we discussed specifically benefits (and sacrifices) that they receive (or had to invest) relating to different aspects related to Daresbury as a STP, as well as their wider business network. This part allowed us to understand the different aspects of value outcomes, as well value recipients for the network configuration represented by each case study.

We analysed the data by initially transcribing the interviews, and by coding the network pictures. Following established methodologies for network picture research (Ramos & Ford, 2011; Henneberg et al., 2006), the textual as well as pictorial elements were integrated as part of a content analysis. In an initial step, the characteristics of the strategic net of each individual focal companies were outlined, in order to find common patterns in line with the three network configurations - believers, seekers, and doubters. Once we had categorized all focal companies into one of the three network configurations (this was done by two researchers independently, and then consolidated), the data (especially relating to the second part of our interviews) was analyzed regarding value aspects using the analytical

framework for value constellations. We applied content analysis, specifically by overlaying our construct components from the analytical framework over the analyzed texts/pictures (Huberman & Miles, 1994; Krippendorff, 2004; Manning & Cullum-Swan, 1994). Abductive inferences were utilized (Dubois & Gadde, 2002), using reflexive contrast and comparison techniques as well as multi-rater assessments (Altheide & Johnson, 1994; Hodder, 1994; Huberman & Miles, 1994). This allowed us to reduce the data and synthesize our findings in the form of aggregated value constellations for each of the three network configurations. The qualitative assessment of the content analysis was done independently by the researchers (two persons). Specifically, we examined whether our findings:

- were directly or otherwise clearly linked to the cognitive belief systems of respondents (Thomas & McDaniel, 1990; Lyles & Schwenk, 1992); i.e. represented the essence of what he had said in the interviews
- were presenting an expression of different categories of value constellations along at least one of the analytical framework dimensions; i.e. clearly distinguished between value aspects of different network configurations
- were mentioned by more than one researcher as being present in the case study material.

Using two independent researchers for our interpretations improves the quality of our analysis (particularly the internal validity via pattern-matching; Krippendorff, 2004). Proportional reduction in loss (PRL) was used to assess inter-judge reliability (Rust & Cooil, 1994). Furthermore, we used Yin's (1994) process to improve our overall case study validity and reliability. To reduce subjective biases (construct validity), we had our key informants review our transcripts and draft reports; our external validity is linked to strong theoretical foundations (i.e. the frameworks for network configurations and value constellations), while

our reliability is improved by the fact that we not only use a large number of case studies (46) but also a fully inclusive dataset for the context we study (i.e. the Daresbuy STP).

5. Findings

Based upon the data gathered, we analyzed the data dependent upon whether the particular entrepreneurial company was best classified as a doubter, seeker, or believer. In each case, we then sought for sources of value, which could come from either rationalization effects or developmental effects (see table 2). As a consequence, these value aspects lie on a continuum, with doubters and believers at polar ends, and the seekers somewhere in between. In addition, for each of the network configurations we also sought to understand the nature of the value appropriated on each of the three levels by the four different parties identified above: the focal company itself (actor level), the set of dyads between the focal company and its interaction partners (dyad level), other companies in the STP (but with whom the focal company did not interact) and the STP management (network level). The findings in each case are summarised concisely in Tables 3, 4, and 5.

In the case of the doubters, there is little value added to the various parties other than the obvious value accruing from the economic transaction of renting the unit in the STP. The focal company is situated there because they find the premises convenient and the rent paid attractive, but there are no wider developmental effects open to them. As far as the focal company and its interactions with other partners are concerned, these are by definition located outside the STP – this is what makes them doubters. Value to these partners therefore relates to the interaction efficiency with which they transact, focusing predominantly on the economic value these parties gains. As far as other STP members are concerned, there exists no meaningful value added in any way – the parties gain no value from having a doubter in their midst. Finally, there are certain benefits that accrue to the STP management: this is not

only the rental income, but also has to do with the lower transaction costs – the doubters do not take up any significant amounts of management time, preferring to operate as single, lone traders. While one can argue theoretically for the existence of developmental effects, i.e. these doubter’s external trading partners have to come physically to Daresbury and thus potentially interact with other possible future trading partners within the STP, we did not find any evidence of this from our respondents. In conclusion, the value here accrues almost solely to the focal company, to its (external) strategic net, plus (mostly economic) income to the STP management – there is little to no real benefit to other STP members at all.

	Rationalization Effects	Development Effects
<i>Value recipients:</i>		
Focal Company (FC) - single actor level	Cheap rent and ‘place efficiency’	None
FC + Interaction partners - dyadic level	Interaction efficiency (external partners only)	Interaction efficiency (external partners only)
Other STP Members – network level	None	None
STP Management - network level	Lower management time and involvement – these people want to be ‘left alone’	Rental Income Possibly higher external exposure as more external Net members have to come to Daresbury to interact with the doubter?

Table 3: Value constellation analysis for the Doubters network configuration

The seekers are those that conduct their business using a mixture of internal and external trading partners. In terms of rationalization effects, they therefore save some time seeking for and interacting with partners, given that some of these are close at hand. Many of them also recognize the potential value that exists dependent upon whether they can identify additional internal trading partners, or mobilize new external partners via internal relationships, and in this sense the seekers can also be seen as potential future believers, as they seek to increase the percentage of business transacted within the STP. From a wider perspective, the focal company and their counterparts internal to the STP all gain value from the same reduction in transaction costs and possible access to additional business. For the external counterparts the value is more marginal, given their lack of visibility among the rest of the net. For other members of the STP not involved in the actual net, there is certainly

more potential value to be gained than in the case of the doubters. Given the visibility of the business being transacted between both on-site and off-site partners, there is always the chance finding better trading partners, coupled with the increased potential value to be gained from the information sharing/networking events arranged by the STP management. Finally, the STP management themselves gain far more value from seekers than when leasing space to doubters, given that a seeker is more likely to convince other parties to join the network – a case of there being value that is accrued from ‘reputational rent’, as well as being a valuable interaction partner to other STP members, therefore making the overall STP better performing and increasing its reputation.

	Rationalization Effects	Development Effects
Value recipients:		
Focal Company (FC) - single actor level	Cuts down seeking and interaction time with those internal actors	Possible sources of future growth are more easily available from STP members
FC + Interaction partners - dyadic level	Cuts down seeking and interaction time with other internal actors Possible access to some required partners	Possible access to potential partners
Other STP Members – network level	Always the possibility of finding a cheaper, better source of resources internally	Some information exchange at social events (breakfast meetings, network meetings, etc
STP Management - network level	The Seekers are more likely to be selling the Daresbury concept to other external partners for you.	Rental Income plus some ‘reputational rent’

Table 4: Value constellation analysis for the Seekers network configuration

Believers are those that really ‘buy into’ the whole concept of the STP, and are there because of the tremendous value that they feel they can extract simply due to the fact that they are there. It is the type and nature of the other companies in the STP that means that they can both source and also deliver value from counterparts within the building. This naturally produces rationalization effects by entailing far lower transaction costs and hence saving managerial time. And, given that the counterparts within the STP are all high technology companies, the focal company is assured of having suppliers who are technologically ahead of the market, hence producing even greater advantages. There is greater value for the other parties in the net too. Given that the majority are internal to the STP, the close proximity

again implies lower managerial and transaction costs, and the greater levels of localized interaction increase the chances of meeting even more potential partners. This increased visibility provides potential value to other STP members outside the focal net too. Finally, the STP management derives even more value from believers than seekers, given that they are likely to extol its virtues to external colleagues to a greater degree.

	Rationalization Effects	Development Effects
Value recipients:		
Focal Company (FC) - single actor level	Lower seeking costs Lower transaction costs with trading partners. More efficient use of managerial time.	Access to more Technology partners
FC + Interaction partners - dyadic level	Geographical proximity lowers transaction costs	A higher probability of meeting more potential interaction parties
Other STP Members – network level	A ‘visual’ one of seeing the benefits being enjoyed by these internally interacting parties, makes you want to do it too?	As with rationalization, makes STP members look to seek additional interacting parties
STP Management - network level	As with Seekers, the Believers are more likely to be selling the Daresbury concept to other external partners for you – only more so?	Rental Income plus some ‘reputational rent’ Customers do your selling for you – Believers try to convince others to join ‘their’ club

Table 5: Value constellation analysis for the Believers network configuration

6. Findings and Discussion

Value is “*key in marketing*” (Lindgreen & Wynstra, 2005, p. 732), being central to any company’s business activities and strategy development (Möller & Rajala, 2007; Stabell & Fjeldstad, 1998). Positioning our research in the broad debate on value, it aims specifically to enrich the body of research on value co-creation in network settings (e.g. Lusch & Vargo, 2008; Lindgreen & Wynstra, 2005). Drawing on the concept of *value network configuration* (Fjeldstad & Ketels, 2006), the aim of this investigation was to assess if and how different types of network configurations of entrepreneurial companies within a STP setting were associated with different value constellations. In order to do so, we developed an analytical framework of value constellations in business networks which we juxtaposed with an existing typology of network configurations. Specifically we applied the net configuration typology previously developed by Ramos et al. (2010) – believers, seekers and doubters – to 46 high-

tech entrepreneurial firms within a UK based STP and results point to clear evidence of there being different value constellations for different kinds of STP tenants.

From our study different considerations emerge on how network configurations and value constellation are related. The first finding refers to our independent variable, network configurations. Our study shows that a network can not only assume different configurations, but also that different configurations can co-exist in the same network; this is contrary to the strategic management literature which seems to consider configurations more as structural options around which a network can be configured in different alternatives (Fjeldstad et al., 2004; Fjeldstad & Ketels, 2006; Bititci et al., 2004; Stabell & Fjeldstad, 1998). In our case, we specifically identified that the three categories of network configurations - doubters, seekers, and believers - co-exist in the same STP, even if, obviously, they can potentially change and new configurations can emerge. To some extent, some of these configurations depend on their co-existence within the STP, e.g. Believers want to have Seeker companies nearby to enable STP-internal value exchanges.

Regarding our first research question, our study shows that different value constellations, in terms of value recipients and value outcomes, are connected to each of the network configuration considered: believers, seekers and doubters (see Tables 3-5). Until now neither the strategy literature nor the IMP literature have explored this link between network configuration and value constellations. On the one hand, the strategy literature has been mostly focused on identifying different network configurations for value co-creation; on the other hand, the IMP studies concentrated mainly on the value consequences at the individual level and dyadic of analysis, i.e. in the actor's and relationship's perspective (Ulaga & Eggert, 2006; Eggert et al. 2006; Flint et al. 2002; Hogan, 2001). Our study shows that in order to understand how and what kind of value is created with respect to different network

configurations, these two views need to be joined in order to achieve a more process-oriented perspective.

In this process, two elements related to the role of actors seem to be particularly relevant when connecting network configurations and thus produce value outcomes. The first is how the actor perceives the different network structures in which it is embedded (we capture this element using a network picture methodology): each actor 'acts' based on its individual image of the surrounding business space. For instance, a believer makes sense of the STP in terms of other companies with whom his company can interact (e.g. as potential customers, suppliers, interaction partners), thus, he does not include other companies within the STP which are, in his view, not interested in collaborations (i.e. he interprets them implicitly as doubters).

The second element is the extent to which actors' resources combine effectively with other actors' and thus promote the establishment of new relationships. For example, a software-related innovation business provides its computer and modelling facilities to a bio-engineering entrepreneur within the STP. Through this collaboration, the software company is introduced to a big pharmaceutical company, a collaboration partner of the bio-engineering venture, and is now developing software for this company.

From our study the concepts of network configuration and value constellation emerge not only as multi-layered, but also as multiplex phenomena; in order to capture the complexity of a network configuration it is arguably not sufficient to consider the different layers of analysis (single actor, dyads and network) but, as our study indicates, the different network configurations not only co-exist (within the framework of the Daresbury STP) but they interact with each other. It follows that network configurations can be also expressed in terms of interdependent network configuration structures. This process of interaction occurs through business actors, who in this sense not only represent boundary spanners in their

particular strategic net, but also between different configurations of within the same overall network setting. One example for this relates to a believer company which had an IP-related issue. It interacted with another company within the STP (with whom it has no business links as they are working in very different sectors). This company, a seeker with excellent relationships with manifold actors outside the STP, had been through IP-related issue before, and is now able to introduce the believer company to an external IP-lawyer experienced in dealing with entrepreneurial ventures. The relational resource of the seeker company (i.e. knowing a relevant IP lawyer) is now exchanged with the doubter company, which subsequently introduced a relationship with this lawyer. Value is therefore created for the believer company, the IP lawyer, but also the seeker company as it has now strengthened the relationship with the lawyer (by positive word-of-mouth) which resulted in lower fees in further interactions with this IP-lawyer.

From this consideration it follows that a change in one network configuration can have an impact on other network configurations, and thus affect the value outcomes generated. The theoretical implication is that to understand value co-creation in business networks we may need to go beyond models in terms of a dependent (network configurations) and independent variable (value constellation), i.e. implying direct consequences, but one should also think in terms of interactions between the different network configurations through which value consequences emerge (thereby implying lateral consequences). These considerations based on our findings create a bridge between strategy scholars and those in business marketing who are starting to define markets in terms of practices (Azimont & Araujo, 2007; Kjellberg & Helgesson, 2006). According to these authors, individual market actors do not act only following one market perspective, but they can be involved in different market practices that appear to be inconsistent from the outside; the consequence is that there are not multiple perspectives on a single reality, rather there exist multiple realities. Moreover, this result also

shows the limits of previous studies in the strategy literature which are associating different network configurations and value outcomes in a static and linear way (Möller & Rajala, 2007; Stabell & Fjeldstad, 1998; Bititci et al. 2004), thereby excluding lateral effects. Thus, the strategy literature would benefit from using complementary insights from IMP research and especially the role assigned to business actors in determining value consequences; at the same time, IMP's scholars should include in their conceptualizations the evidence that different network configurations can be related to distinct value constellations. In this sense we agree that network outcomes are difficult to connect to a specific network because each company is part of several networks (Ford et al., 2003); however, analytically more relevant is the notion that a company can be part of, and interacting with, different network configurations within the same network.

In addition to this, we also note that strategy literature on value constellations is rather prescriptive regarding each network configuration and the resulting competitive advantage, as well as their industry alignment. Our research corroborates the findings by Baraldi and Strömsten (2006) according to whom the identified configurations are not associated with specific industries, instead they are found widely distributed across all the different entrepreneurial ventures which were located in the Daresbury STP. Moreover, our research clearly shows an association between network configurations understood as resource interfaces within strategic nets, and different value constellations: the STP is perceived as a facilitator for getting together “*interdependent elements that increase the density of resources for the participating actors*” (Storbacka & Nenonen, 2011: 256). This is congruent with the idea and with the finding that it is for the *seekers* and *believers* configurations that value configurations can be found with rich value outcomes for manifold value recipients. Our research shows some overlapping findings with Möller and Rajala (2007) and Möller et al.'s (2005) work on strategic nets: nets such as those developing in STPs are value creating

systems where actors create value by carrying out specific activities. However, the results from our study draw more intensively on the nature of the partners with which the focal entrepreneurial actor interacts than more specifically on the nature of their activities.

Moreover, given that we have chosen to conduct this research in a very specific setting, i.e. a STP, we were able to identify (network configuration) outcomes of a different nature to those that had been previously identified in the literature (e.g. Bower, 1993; Perks and Jeffery, 2006; Phelps, 2010). For example, in a believer configuration the STP manager can benefit from positive word-of-mouth which can attract other potential members to the innovation network. On methodological level, our investigation also shows that value outcomes expressed in terms of efficiency (rationalization) and effectiveness (development) (Gadde & Håkansson, 2001; Håkansson & Persson, 2004) provides an appropriate framework in order to grasp and diagnose the complexity of value consequences generated in a business network. This finding has methodological implications beyond academic research and provides a contribution to how STP management as well as policy makers can analyze the impact of innovation networks, particularly STPs.

7. Implications, Limitations, and Further Research

From our study important managerial implications emerge, both for practice and policy making. First of all, our findings indicate that treating all current or potential tenants in a structured innovation network such as an STP as being part of a homogeneous group is clearly an error on behalf of any STP management team. Rather, they have to look to offer and to gain different kinds of benefits (and cope with different kinds of sacrifices) from different kinds of entrepreneurial firms, thereby managing and balancing a portfolio approach to value in the STP. The implications for the STP management team are to ensure that they get what they regard to be an optimal mix of clients, which implies that they attempt to reduce

the numbers of doubters (although they provide some resource utilization benefits if the resource cannot be used otherwise), given that the only value accruing to the STP itself in the case of doubters is rental income. Indeed, while renting space at the STP might suit the doubter, it results in suboptimal benefit accrual to the STP management if the proportion of doubters becomes too large. Instead, the optimal mix would be some combination of seekers and believers, with the implicit strategy in mind of attempting to turn the former into the latter and, in any case, implementing a continuous monitoring of how configurations and the role of actors will change. Policy makers on the other hand could have different interests: a greater amount of doubters would imply a stronger interface between the STP members and outside companies, and this could bring greater benefits for the broader business community in terms of knowledge transfer. This highlights a potential conflict regarding the portfolio management of an innovation network between the STP management and policy makers.

Moreover, understanding the nature of the value constellation underlying each of the three identified net configurations and also the key relationships between actors, could be also of great utility for STP potential members: the new ventures may consider this information when deciding on the network configuration which is more appropriate for their set aims; at the same time they may investigate the current or potential composition of different STPs to find which have an optimal mix of configurations that was described above and also which actors can be critical for determining changes in the existent ones.

As for future research, our study moved the attention beyond the link between structures (configurations) and outcomes, to the interactions between different network configurations as part of a defined setting (a codified innovation network in the shape of an STP) and the resulting distinct value constellations, and in particular to the role of strategic nets of focal entrepreneurial actors in these interactions. However, insights from our study are preliminary and specific to the STPs, and further investigation on the features of these

interactions are required. In addition to this, it would be interesting to go back to the same STP where we have collected our data and to confront the respondents with the findings from this study. The main aim would be to understand if these new ventures are aware what result their configuration choices in terms of value constellations have on other actors. Another option would be to collect new data after a certain time period from the same STP to find out if there have been any changes in the focal companies' identified configurations and value constellations and if not, to see if there are other types of value that emerge after a certain period and that could be added to the identified value configurations. While the time dimension has been excluded from our current case analyses, it has been identified as an important aspect of case study research (Halinen & Törnroos, 2005).

An obvious limitation of our work is that while it was a census of this particular STP, our work did not entail a broader study of other STPs or general innovation networks. Clearly, such studies would add to our knowledge about possibly different network configurations and the way they relate to value considerations, and so reinforce or qualify the findings from our study.

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