Managing knowledge in smart networks

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Abstract: Network technologies offer the opportunity to reshape connections among economic players by increasing the power of customers, makers and knowledge-intensive business firms in innovation processes and value-creation dynamics. Through a theoretical description of the convergence of manufacturing and service offerings, this paper discusses the various conceptions of smart networks and proposes an integrated definition with three key elements: an entrepreneurial strategy, the combination of different networks and orchestrators with a multifaceted absorptive capacity. Based on qualitative research involving two Italian firms, this paper investigates the structures of smart networks, their cognitive and organisational characteristics and the actors that lead them. The paper shows that these firms do not act as network orchestrators in a hub-based model. Rather, they allow the development of innovation activities and the production and combination of new knowledge through web-based technologies and distributed interactive processes among network nodes. Moreover, smart networks are not limited to firms but also involve consumers.

Keywords: open innovation; smart networks; orchestrator; servitisation; knowledge-intensive business services; KIBS; coproduction; managing knowledge.


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1 Introduction

Advancements in both information and communication technologies (ICT) and manufacturing technologies have deeply transformed how economic processes within and among organisations are structured at the international scale. Innovation, production and consumption activities have increasingly become open and distributed processes (e.g., Chesbrough, 2003; Nambisan and Nambisan, 2008). New emerging technologies, such as three-dimensional (3D) printers, have expanded the opportunities for a larger number of individuals (makers, consumers) and small firms to translate innovative ideas directly into real products (Anderson, 2012). Moreover, the importance of such technological solutions has increased as the web’s powerful ability to connect individuals globally enables managing product innovation through the open innovation paradigm and
open-source practices. In addition, both innovation and production processes can be conducted electronically. Thus, firms have multiple strategic options to establish and organise their value networks (Normann and Ramirez, 1993). This paper focuses on the dynamic process of network creation and management in this new technological scenario. Specifically, this paper considers studies which explore the relationships between manufacturing and service activities in the value chains from different angles and identify interesting trends worthy of investigation.

The distinction between manufacturing and service offerings has become increasingly blurred. On one hand, the servitisation of the economy has been seen as a progressive shift from materials to intangible value sources (Vandermerwe and Rada, 1988). Accordingly, manufacturing firms provide value to customers by investing in the service-related aspects of their products and by offering solutions instead of simple goods. Marketing scholars have also discussed the service-dominant logic (Vargo and Lusch, 2004) that specifically stresses the emerging paradigm in which a firm’s offering are strictly dependent upon customer input and relations.

In contrast, scholars who study services have explored the tangible sphere of services and their impacts, such as customer evaluations of service quality. Other scholars have described the process of service industrialisation (Ritzer, 1996) in which the logic of economies of scale enters into service production. Through modularity, service providers can combine the advantages of customisation with the benefits of standardisation (Sundbo, 2004). This issue has also received some attention in studies focused on knowledge-intensive business services (KIBS) (e.g., Miozzo and Grimshaw, 2005). With their knowledge-based service provision, such businesses can couple customisation and standardisation by adopting innovation management approaches similar to those of manufacturing firms (Tether et al., 2001).

From a different theoretical angle, studies on global value chains (e.g., Cattaneo et al., 2010) have explored how buyers – large retailers and brand marketers – structure and govern economic activities at the global level by focusing on research and development (R&D), design and marketing activities and the organisation of manufacturing processes through offshoring and global outsourcing.

In the new technological scenario, brand marketers, retailers and designers (KIBS) can identify the right supplier at the international level and decouple the process of product development from the manufacturing step in the value chain. Despite this promising technological scenario, it remains an open question how those new dynamic networks along the border between the manufacturing and service domains are formed and managed. Specifically, how actors (manufacturing firms, KIBS, consumers) can structure and manage the knowledge management processes underlying product innovation and production should be further investigated. Studies on smart business networks (Vervest et al., 2004) have provided initial insights into supplier-buyer linkages, with a focus on manufacturing firms. However, along with the new role played by service companies, even consumers can become producers in such a technological setting. The knowledge required to effectively and efficiently structure and manage (design-driven) product innovation (Verganti, 2009) and related manufacturing processes is dispersed among many players and takes on different forms not easily shared. Therefore, we propose that the creation and management of smart value networks is a crucial issue that has not yet been explored adequately.

In this context, this paper investigates the characteristics of the new smart business networks, their structure and which actors lead them. The second section discusses
various theories about the convergence of manufacturing and services and about the role of customers and then presents an integrated concept of smart networks. The third section analyses two case studies of Italian manufacturers and KIBS that developed their activities similarly to this concept. The fourth section discusses the results, and the concluding section presents final remarks on the implications and limitations of this study and activities for future research.

2 Theoretical section

2.1 Converging manufacturing and services processes

The servitisation of manufacturing products has received much attention from different theoretical perspectives (Baines et al., 2009; Paiola et al., 2013). The first stream of research considers the evolving trends in services and how manufacturers have reshaped their products as more service-based offerings (Allmendinger and Lombreglia, 2005; Oliva and Kallenberg, 2003). Manufacturing products are designed with a mix of tangible and intangible elements intended to increase customer loyalty and offer additional value to customers (Rothenberg, 2007). According to Vandermerwe and Rada (1988), firms can increase their value proposition by moving from goods to services or, even better, by adding services to their traditional (physical) offerings, i.e., developing hybrid offerings, as some marketing scholars have called them (Shankar et al., 2009; Ulaga and Reinartz, 2011). By doing so, manufacturing firms can lock in their customers and develop a sustainable differentiation strategy (Neely, 2008).

A second stream of research explores this shift in the marketing field by emphasising the role of the product’s intangible elements – from brand to design – and firms’ long-term customer-relationship management orientation. In this context, the marketing approach proposed by Vargo and Lusch (2004) has received much attention. The authors described the new service-dominant logic structuring the present competitive landscape and the fundamental premises of this paradigm. According to the authors, “goods are distribution mechanisms for service provision” [Vargo and Lusch, (2004), p.8], and customers are engaged constantly in co-creative activities with firms – including manufacturers. More significantly, the real sources of competitive advantages lie in knowledge and knowledge management within coherent value systems (Normann and Ramirez, 1993). Products result from a knowledge-management process that involves firms and their value systems, which involve consumers.

Studies on KIBS (e.g., Bettiol et al., 2012; Di Maria et al., 2012) can enrich this theoretical framework and contribute additional explanations of the transformation of manufacturing firms. KIBS provide customised services and co-produce knowledge and innovation with their business customers and other players in the value network (Muller and Doloreux, 2009). From this perspective, the shift towards greater integration of the manufacturing and service dimensions of economic activities can be explained by considering studies on KIBS. By focusing on knowledge-intensive services, we can observe and interpret the dynamics of manufacturing firms from two perspectives of analysis: the output of manufacturing firms and the internal organisation and value chain of the firms. Thus, we propose that manufacturing firms can be interpreted as service-based firms and, more specifically, can be considered to be KIBS.
The first perspective of analysis related to the convergence of manufacturing and services was presented in the discussion of the servitisation of products. Turning to the second perspective, we should keep in mind that every firm performs activities that provide services to other internal activities. This idea is at the core of the Porter (1985) value chain. The more knowledge-intensive the activities are – from R&D to marketing (not including operative sales) – and the more strongly they are relevant to the entire organisation, the more such a firm can be considered a KIBS (even in the case of realisation of products for final markets).

The process of changing a manufacturing firm into a KIBS can follow two paths. On the first path, the firm becomes a group in which one or more firms specialise in KIBSs offering (Cainelli et al., 2006), as in the case of spin-off of internal processes related to KIBS. Along the other path, a manufacturing firm progressively specialises in generating value activities that can be assimilated into services. The emergence of globalisation and the rise of global value chains (Gereffi et al., 2005) have supported the development of strategies to focus firms on more added-value and/or knowledge-intensive activities by outsourcing manufacturing operations to a global network of suppliers. The fragmentation of production occurring at the global level in many industries results from the multiple drivers of transformation of the manufacturing firm and emphasises the rise of lead firms focused on controlling service-related activities (R&D, marketing, retail) to compete (Gereffi, 1994; Javalgi et al., 2009).

Expanding the focus on the manufacturing-services dichotomy, a less well-known process in the literature is the transformation of service firms into manufacturing firms or, better, the adoption of a manufacturer’s logic by service firms. From the perspective of KIBS, an interesting aspect of firms’ evolution is the capability to manage a supply chain, including strictly manufacturing operations, in order to exploit the knowledge acquired by supplying services supporting production. In this view, a KIBS has not necessarily transformed itself into a manufacturing company. Rather, it has focused on learning how to control manufacturing processes; this process of change stands as an opposite path to the one previously described. KIBS’ evolution towards more manufacturing activities has been influenced by fragmented international production, the communication and information-sharing capabilities of ICT and the modularisation of products (Pisano and Shih, 2012). In this environment, firms – both manufacturing and service – can select and manage supply chains dedicated to specific projects and formed by players, even very distant ones, without needing to invest in proprietary factories. Websites (e.g., Alibaba.com) dedicated to business-to-business electronic commerce (e-commerce) allow firms to extend their supply chains at the global level in order to develop products made by a KIBS in another location. In particular, this process can be observed in design services, where a growing number of firms have integrated their traditional services with the commercialisation of new products. These KIBS can both produce creative results and exploit them through manufacturing.

2.2 Extending the business landscape to consumers and consumption activities

Under the Fordist paradigm, the management of innovation was characterised by a relevant centralisation in which the research function was dedicated to elaborating and producing new knowledge. The output of this process was firm-specific knowledge strictly linked to the firm’s organisation and structure. Only with the emergence of
information technologies has knowledge been able to circulate virtually in and out organisations’ borders, completely separated from a specific material product (Evans and Wurster, 2000). The development of new technologies with communicative potentialities has redesigned the economic space, enlarging the dimension of interactivity and exchange. The major competitive challenge facing firms is to ensure that knowledge circulating in a wide network retains value its specificity of sources and kinds of knowledge (Belussi and Staber, 2012; Chesbrough, 2003).

In this framework, the literature on collaborative innovation has emphasised the primacy of expert customers and lead users’ contributions of knowledge to product development (Greer and Lei, 2012; Von Hippel, 2005). On one hand, some studies (e.g., Ozer, 2009; Schoormans, 1999) have described the profiles of lead users, both organisations and expert consumers, in order to identify the special characteristics of these customers and demonstrate the success of co-production. With strong product experience and personal ability, lead users develop highly valuable knowledge about new product features, new products and market trends. To gain from these sources of knowledge, firms need to develop specific strategies of co-production to involve these individuals in firms’ internal processes of new product development and marketing activities (Dahlander and Magnusson, 2008; Prahalad and Ramaswamy, 2000).

Other scholars have focused on the social scale of collaborative innovation, stressing the strength and utility of the community mechanism for idea production, knowledge selection and sharing of meanings (e.g., Sawhney et al., 2005; West, 2009). From this perspective, the dynamics of socialisation make the community an alternative and, to many scholars, more effective framework than the market mechanism (Franke and Shah, 2003; Kozinets et al., 2008) within which to develop new knowledge about products and their uses. Group creativity, mutual engagement and social support, shared meanings and practices, and members’ dynamic expertise, among many other characteristics, distinguish communities as key players in the innovation process.

Studies on open-source software have clearly described the peculiarities of this new form of innovation (David and Rullani, 2008) in which a firm involves a large number of players in a web-based process of knowledge creation. The internet serves as the crucial infrastructure for the firm to initiate large, global collaborative dynamics for innovation purposes (Tapscott and Williams, 2006). At the same time, the web also offers remarkable opportunities for commercial dynamics, opening up new possibilities even for firms that address market niches (Anderson, 2008). By exploiting relationships with online communities and relationship marketing practices (such as a one-to-one approach and customised products based on mass customisation logics), a manufacturing firm can make its relations with its market interactive and increase the size of its service-based offerings (Ramaswamy, 2008).

Additionally, network technologies are becoming useful in managing globally distributed manufacturing processes, both within firms and through outsourcing. Network technologies support the transformation of manufacturing firms into more service-oriented ones and the opportunity for service firms (KIBS) to reshape their value networks to include manufacturing activities. Suppliers are contacted and managed at the global level – e.g., in emerging markets (Cheung et al., 2011) – or close to the market level to reduce costs and/or environmental issues.

Further, evolving technology trends are pushing the borders between manufacturing and service domains and between production and consumption. Anderson (2012) described an emerging form of capitalism that might overcome the traditional firm’s
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barriers to tapping into the innovation potential of makers. Makers – creative individuals, consumers, designers – can benefit from the rise of new production technologies to become producers and establish their own small-scale manufacturing processes. By exploiting the opportunities of open source-based innovation mechanisms and the web, makers not only employ new technologies to develop sustainable manufacturing projects for their own use but also launch entrepreneurial initiatives to offer their new products globally. From an opposing perspective, makers can also become suppliers of more extended value systems by providing their highly customisable manufacturing capabilities to other manufacturing or service firms. In turn, these firms which lead the value network can exploit the web to connect producers (designers, makers and suppliers) with consumers.

2.3 The emergence of smart networks

The conceptual space we defined – where ICT presents novel opportunities to connect and hybridise manufacturing processes, services and consumption – offers fertile ground for generating innovation and spurring the development of new business ideas at existing firms and new ventures (Allmendinger and Lombreglia, 2005). In particular, such a space seems ideal for the emergence of smart networks.

Before proposing our own definition of this concept, we shall recall that the term ‘smart’ is among the most frequently used in the present economic and management debate. ‘Smart specialisation’, referring to regional economic systems, recently became the key concept for innovation policy design in the European Union context (McCann and Ortega-Argilès, 2013). The concept of smart specialisation entails two principal actions:

1. the determination of what a region does best and of its knowledge base
2. the development of policies capable of enhancing and developing this original resource (Foray et al., 2011).

While smart specialisation has precise boundaries as a regional policy, the concept of smartness at the firm level is rather less clear. On one hand, ‘smart’ can serve various specific meanings and applications: smart companies, smart strategy, smart entrepreneurs, smart products or services and smart (business) networks. On the other hand, generic uses of the term could be replaced by ‘flexible’, ‘innovative’, ‘competitive’, ‘viable’, ‘intelligent’ or combinations of these terms. For the purposes of this analysis, we focus on research on smart business networks, mostly from information technology and information systems literatures, that describe as ‘smart’ networks whose structural flexibility guarantees better performance than competing structures (Pau, 2013; Shaw et al., 2004; Vervest et al., 2004, 2009). To use the words of Vervest et al. (2004, p.229), “smartness is a property whereby the network can create ‘better’ results than other, less smart business networks or other forms of business arrangement”.

Based on the research discussed, we develop a more selective approach to the smart network concept, with three key elements.

1. the smart network is the result of an entrepreneurial strategy
2. the smart network is a combination of different networks
the smart network requires the existence of absorbent capacity at the level of the orchestrator of the smart network itself.

To clarify the first element of our approach to smart networks, it is useful to refer to entrepreneurship studies, which define entrepreneurship as the ability to search for, identify and exploit new business opportunities (Shane and Venkataraman, 2000; Venkataraman, 1997). Concisely put, a firm which, at a specific point in its life cycle, initiates an entrepreneurial strategy re-establishes its set of fundamental relations with its environment (Murray, 1984). This environment is characterised by different actors – other firms, institutions and, for the purposes of this analysis, consumers – which possess resources such as knowledge that might interest the firm. The existence of such external resources is necessary for entrepreneurial firms, which generally exploit opportunities by reaching beyond the limits of the resources that they directly control (Stevenson and Jarillo, 1990). Thus, entrepreneurial firms realise their strategic objectives by selecting and utilising various external resources, that is to say, by managing a wide network of relationships with external subjects (Lechner and Dowling, 2003; Furlan et al., 2014). Smart networks and entrepreneurship are linked because an entrepreneur who identifies a new business opportunity and seeks to exploit it creates a new network.

In order to understand a smart network as a combination of different networks, it is useful to refer to another field of literature: business ecosystems, which saw a surge of work after Moore’s (1993, 1996) seminal contributions. The concept of the business ecosystem – used mainly but not exclusively in the innovation management field – emphasises the interdependencies among the actors in the ecosystem, their complementary and coevolving capabilities and the system’s focus on unique customer value propositions (Adner and Kapoor, 2010; Nambsian and Baron, 2013). Until now, scholars’ attention had been attracted by hub- or platform-based innovation or operation ecosystems, in which a single large corporation establishes and leads the system. Take, for example, IBM’s Power Architecture, Apple’s iPhone, Amazon’s e-business and Wal-Mart’s supplier system (Ceccagnoli et al., 2012; Gawer and Cusumano, 2002; Iansiti and Levien, 2004; Nambsian and Baron, 2013). In this kind of ecosystem, the lead firm exercises a strong influence over the behaviours of all other members (Nambsian and Sawhney, 2011). However, other types of business ecosystems exist (Nambsian and Baron, 2013; Pisano and Verganti, 2008). In this paper, we deal with an ecosystem – or smart network – in which the leader is a relatively small or medium enterprise (SME) which does not exercise hierarchical power over the other system members as owner of the hub or platform technology but, instead, shapes and supports their behaviours based on common interests. Furthermore, autonomous networks coexist and interact in this ecosystem. These networks can be assimilated into distinct populations of actors (manufacturers, service providers, consumers) with different characteristics, such as aims, languages, and internal dynamics of competition and cooperation. In this sense, the approach we propose to understand and explain smart networks is closer to the biologic view of ecosystems than the vision characterising studies on hub-based business ecosystems.

The third element which characterises the smart network we propose concerns the network orchestration activity carried out by the lead firm (either a manufacturer or a KIBS) and is clearly linked with the previous element. Prior studies have addressed network orchestrators and knowledge mobility, but again, their focus has been mainly hub-based systems or networks. In fact, hub-based networks are defined as communities
where members enjoy a common language and, due to its absorptive capacity, the orchestrating firm facilitates knowledge mobility (Dhanaraj and Parker, 2006; Hurmelinna-Laukkanen and Nätti, 2012). Such a relative homogeneity is missing in the smart networks emerging in the space among manufacturing, services and consumption under discussion. In general terms, to interact with and coordinate network members, the orchestrator needs an adequate absorptive capacity, which is a firm’s ability to monitor, value, acquire, assimilate or transform and, finally, exploit external knowledge (Cohen and Levinthal, 1990; Todorova and Durisin, 2007; Zahra and George, 2002). In the case of the smart networks discussed here, the actors connected by the orchestrator (a manufacturer or a KIBS) belong to different networks (populations) and remain autonomous and heterogeneous as far as the language that assimilates their members is concerned. Thus, the orchestrator has to develop a multifaceted absorptive capacity because it has to be able to interact with all the players (e.g., designers, consumers, manufacturers) by acquiring and exchanging knowledge from multiple sources and transferring it within the smart network.

3 Case studies

3.1 Methodology

We adopted an inductive, multiple-case study methodology to understand the structure of these new smart networks, their internal knowledge management dynamics and the role of actors that lead them. The choice of this methodology is appropriate as the objective of the study is to put forth new hypotheses and develop existing knowledge (George and Bennett, 2005). This methodology is especially useful for gaining understanding in research areas in which theoretical insights are still not well developed, such as those under scrutiny (Ozcan and Eisenhardt, 2009).

The two case studies selected for analysis involve SMEs that developed a network in order to implement an innovative entrepreneurial strategy while shifting from manufacturing and services or vice versa. Following a theoretical sampling strategy, we selected two cases representative of opposite situations: a service firm that began performing manufacturing activities (Garage Design) and a manufacturing firm that transformed itself into a service provider (Antarei). The selected firms are all in north-east Italy and orchestrated smart networks to develop a new business model based on an original combination of manufacturing, services and consumer involvement. The use of multiple case studies enables more robust results than the single-case design; in fact, replication of the analysis on multiple cases allows greater generalisation and improves the external validity (Yin, 2003). In addition, multiple cases enable broader exploration of the variables studied and of the research questions (Eisenhardt and Graebner, 2007). These cases cannot be considered representative of a universe; instead, they were chosen because they are ‘particularly suitable for illuminating and extending relationships and logic among constructs’, rather than for obtaining statistically accurate data on the variables’ distribution within the population [Eisenhardt and Graebner, (2007), p.27]. Information on the firms analysed was collected through interviews with the firms’ entrepreneurs during winter 2012 and spring 2013 and from company documents and website analyses.
3.2 The Garage Design case

Garage Design was founded in 2010 as an experiment to test the feasibility of small-scale production based on excellent design and craftsmanship. The idea was to connect emergent designers with sophisticated customers looking for distinctive, high-quality products and limited editions. The experimental character of Garage Design is evidenced by the characteristics of its four founders from different backgrounds and expertise: Paolo Braguzzi, a manager; Tommaso Guerriero, an entrepreneur in the furniture industry; and Elisa Barbieri and Alessando Molinari, specialists in the communication service industry based in Modena. From this perspective, the firm, in and of itself, marked a multidisciplinary effort to establish new relationships between demand and supply and to explore new niches of consumption. Although a service company, Garage Design aimed to manage a process for producing and selling physical goods that involved final consumers, designers and local producers.

Having set this goal, Garage Design developed an innovative process to match design with unfulfilled consumer requests. The (knowledge management-based) process has five phases. The first involves the collection of new proposals from designers through two main means: a call for proposals on a specific subject published on Garage Design’s website and a less-structured submission process in which designers share their projects and ideas with Garage Design through its website. The inspiration for this approach came from the principles of open innovation. Garage Design seeks unconventional projects from new talents not well established in the design scenario. It wants to produce brand-new perspectives in fashion and interior design, and the open innovation approach seems to be the right means to do so.

The second phase is selection. Not all proposals are accepted but are scrutinised by a panel of experts composed of the Garage Design’s founders and external judges from the fields of education, design and art. This phase is unique to Garage Design’s approach. According to Molinari, one of the company founders, selection is important in order to mediate the openness of the first phase and to focus on promising projects whose innovativeness and exclusivity present potential. The Garage Design judges are aware that their decisions are subjective but think that subjectivity gives originality to their undertaking.

After selection comes the third phase: engineering and prototyping. The proposals are put into practice as a network of artisans in the Modena area physically prototypes them. This phase is important to assess the quality and economic and technical feasibility of projects. Usually, the third phase involves a highly interactive process, with designers collaborating with artisans to improve and adapt their project as problems emerge in the physical construction (translating tacit or uncodified knowledge into real artefacts). In the transition from a two-dimensional drawing to a 3D product, the project quality is greatly influenced by artisans who advise designers based on their deep knowledge of materials and manufacturing processes.

Once the proposal has passed successfully through engineering and prototyping, the fourth phase begins: publication of the product on the Garage Design website. At this point, customers can evaluate the new proposal by viewing the images and technical details available online and placing e-commerce orders. The website not only serves as an online catalogue but also develops a community where consumers interact with one another, exchanging opinions and comments on the projects. Moreover, the website also
links designers and potential consumers and allows customers to request personalisation of products (this is possible with small-scale production and limited edition approaches).

Eventually, when a certain amount of orders for a product is collected, the fifth phase begins: production. Based on the cost and complexity, Garage Design sets a minimum amount of orders it needs for each proposal to start production, which is managed through a network of SMEs in the Modena area. Depending upon the project characteristics, some of these firms could have been involved in the engineering and prototyping phase.

Garage Design is not merely the orchestrator of a hub system: It performs complex activities at the interface of designers, consumers, artisans and small firms. In managing and orchestrating the process outlined, the founders and those working with Garage Design have developed an important capability to select designers with the most potential and dialogue with them, to engage with consumers and attract their attention and to manage prototyping and batch production. This multifaceted absorptive capability has proven fundamental to Garage Design’s success.

Although still in the start-up phase, the project is self-sustaining and has become a benchmark for its unique approach to creativity and innovation. Several Italian brands have asked Garage Design to organise online workshops on selecting new design proposals in order to innovate corporations’ product lines. So far, Garage Design has received approximately 10,000 project proposals, selected 30 designers, and manufactured and put on the market ten products. For example, Garage Design managed the selection of two new kitchen lines for young consumers in collaboration with Chic, one of the most famous Italian kitchen producers.

3.3 The Antarei case

Antarei is a medium-sized company based in Zoppola, close to the Livenza furniture district in northeast Italy. The company was founded more than 40 years ago and specialises in the production of high-quality kitchen doors. Acquired in the early 2000s by Carlo Nardo, an entrepreneur experienced in the mechanic sector, the company grew considerably until 2008 when the recession crisis completely changed the competitive landscape of the industry. Second-tier suppliers such as Antarei were the most challenged by shrinking final demand at the global level; their business clients transferred the risks and costs of the crisis onto them, necessitating lower prices and higher levels of service.

Recognising that continuing with the existing business model was a dead-end path, Nardo developed a new model, moving the focus from business-to-business production to business-to-consumer service. To its traditional production of kitchen doors, Antarei added a new division of kitchen renewals, which accounts for a minor but rapidly increasing share of the firm’s overall turnover. Antarei offers three types of renewals: a base renewal, in which doors and hardware are replaced but the structure is unchanged; a functional renewal, including structural changes; and an advanced renewal, which changes the existing kitchen layout, adding or eliminating some parts. Given the direct contact with the company and the possibility to maintain parts of the kitchen (the structure) that do not need to be changed, clients can save up to 70% on a renewal compared to buying a new kitchen.

While Antarei once sold its products to business consumers, it has moved to engage and interact with final customers. Such collaboration is especially needed in the design phase when each kitchen is completely customised: Even if Antarei hired new personnel
to support consumer choices, it is the client who, through ICT technologies, performed the majority of design activities. The company developed a special application on its website allowing clients to select the colour, material and form of each kitchen component being replaced and to request a quote for the kitchen. Following this first contact, a specialised operator visits the client to take measurements and finalise the order. Antarei then produces the required components according to the consumer’s needs, and after few weeks, the operator installs the complete kitchen or the desired pieces at the customer’s location. Other than in design, collaboration with the clients is essential because, in this innovative business model, they become suppliers of a key component of the final product (the structure).

The development of this business model required the firm to move from high-volume production to customising products and to shift its focus from production to customer service and marketing. Through its website and blog, the firm increasingly engages directly with customers. This interactive process focused on the design of the kitchen, the colours and the application of its doors might lead Antarei to hire a designer. The interaction enabled by the blog has supported the development of a small yet lively community of consumers. Thus, the internet and ICT have played a key role in enabling the introduction of this innovative business model, substituting for functions traditionally performed by distributors.

In order to move toward this new business model – which contributes 10% of Antarei’s turnover and is on an upward trend – and interact with customers, the company needed to modify its knowledge base by acquiring new competences. It developed its design and communication competences internally, and its distribution and installation competences by engaging with network partners. To achieve competences in communication, design, ICT and customer care, Antarei hired dedicated personnel. The transformation into a service-based company also affected its production competences: The organisation of labour was modified so that each blue-collar worker can manage each production phase, whereas in the past, workers specialised in few production phases. Additionally, Antarei invested in building a network of independent operators specialised in installing kitchens in order to improve customer service. Such new competences have been particularly useful in developing the business and identifying new business opportunities. For example, based on consumer suggestions, the company recently decided to launch a line of completely new kitchens under the Antarei brand.

4 Discussion

The two case studies examined show the emergence of alternative smart networks oriented towards the creation of new value through the original combination of manufacturing, services and consumption. Garage Design was founded with the explicit aim to exploit the advantages offered by network technologies to connect designers and artisans in a niche market of (global) consumers. The conceptualisation of Garage Design’s entire process and monitoring activities is fundamental to preparing its offerings for the market. The firm is a KIBS in all respects, providing services to the three distinct networks of designers, manufacturers (artisans), and consumers. Such networks form a smart network coordinated by Garage Design to develop and realise new and highly creative products. Regarding the cognitive profile, this KIBS favours the production and circulation of knowledge within each individual and the overall network.
The Antarei case presents the opposite trend, in which a firm specialising in components for kitchen producers shifted to offering customised services for the final market, exploiting the web’s communication and interactive potential. Significantly, Antarei’s path is not the traditional process suppliers take when upgrading (Furlan et al., 2009). The firm, instead, has addressed the final customer directly, thus shifting from business-to-business to business-to-consumer relationship management through web-based enabling technologies such as social networks. This strategy has required a new configuration of the value proposition and of the related processes and activities. The resulting smart network is formed of designers and a community of consumers, external commercial partners and technicians who contribute different knowledge to product development and service provision.

Table 1 Case study comparison

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<tr>
<th></th>
<th>Garage Design</th>
<th>Antarei</th>
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</thead>
<tbody>
<tr>
<td>Orchestrator</td>
<td>KIBS</td>
<td>Manufacturing firm</td>
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<tr>
<td>Convergence process</td>
<td>From service to include manufacturing</td>
<td>From manufacturing to include service</td>
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<td>between service and</td>
<td></td>
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<tr>
<td>manufacturing</td>
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<tr>
<td>Composition of the</td>
<td>Designers</td>
<td>Consumers</td>
</tr>
<tr>
<td>smart network</td>
<td>Consumers</td>
<td>Retailers</td>
</tr>
<tr>
<td></td>
<td>Local manufacturers</td>
<td>Assembling technicians</td>
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<tr>
<td>Knowledge management</td>
<td>Organised in five phases:</td>
<td>Organised in three phases:</td>
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<tr>
<td>process</td>
<td>• idea generation</td>
<td>• idea generation through interaction</td>
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<tr>
<td></td>
<td>• selection</td>
<td>• knowledge recombination</td>
</tr>
<tr>
<td></td>
<td>• translation into artefacts (prototyping)</td>
<td>(modularity, customisation)</td>
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<td></td>
<td>• evaluation (validation)</td>
<td>• production</td>
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<tr>
<td></td>
<td>• production</td>
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<tr>
<td>Interaction with consumers</td>
<td>Identification of the products to be produced (online platform)</td>
<td>Customisation of web-based solutions</td>
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Source: Authors’ analysis

These case studies show how firms with diverse competences and expertise develop new entrepreneurial initiatives in order to take advantage of the promising scenario offered by emerging communication and manufacturing technologies. The lead firms structuring smart networks can be either manufacturing or service companies who intend to use multiple active nodes to create new knowledge and manage innovation in a new, unconventional framework. The consumer plays a crucial role as a co-innovator who actively interacts with the firm (a KIBS or manufacturer) and other network players. The internet is also critical, allowing customers to share their preferences and support niche production that is economically relevant because of the aggregative effect of the web (e.g., community-driven mechanisms) (Rheingold, 2003; Sawhney et al., 2005). Therefore, the type of smart network we investigated extends the definition of smart business networks provided by Vervest et al. (2004) as it also includes consumers (both users and members of a wider community). Moreover, it clearly demonstrates that an
absorptive capacity oriented towards different fields is a necessary aspect of the orchestrating activity performed by the lead firm in the smart network.

5 Conclusions

An original theoretical contribution of our work is the identification of different types of lead firms that create and manage smart networks within the context of the convergence of manufacturing and service activities. In addition, our analysis shows that these firms are not merely network orchestrators (Dhanaraj and Parkhe, 2006) whose role is limited to the plug-and-play method of the contributors to other nodes which follow a shared standard (e.g., modular interface). Instead, our lead firms allow the development of innovation activities and the production of new knowledge (about products, consumers’ needs, materials, techniques, etc.) which is shared within the smart network. From this perspective, the division of labour among players in the value system – and at the geographical level – can be defined dynamically. From a managerial perspective, our analysis provides insights into the elements an orchestrator must take into account in designing its network, along with the associated implications for knowledge management (promotion of co-production and interaction at a distance).

One limitation of our research is that the firms analysed in the case studies are in the start-up phase; thus, the performance they achieve and how they share the value created within the network should be further investigated. Moreover, the geographical scale of a network can negatively affect innovation opportunities unless cognitive proximity develops among the players involved (Boschma, 2005). As suggested by studies on global value chains, whenever the complexity of the transaction increases and the level of codification remains low, the best governance model for the global value chain is the relational model, unless modularity occurs (pushing towards a turn-key form of governance). According to this viewpoint, how the (re)configuration of such a network influences the process of knowledge creation and use (innovation) should be investigated.

References


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