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Network Co-Operation As a Source of Competitiveness in Medium-Sized Finnish Sawmills

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In the Finnish sawmill industry, inter-firm collaboration has often been brought up as a means of creating a competitive edge in global markets by achieving economies of scale. According to the resource-based view (RBV), a firm can evaluate its current or potential partners by considering firm-level collaboration as a portfolio of complementary strategic resources. The specific focus of the study is on examining the types and forms of sawmill co-operation, how the co-operation emerged and which firm-specific resources are mainly related to co-operation. Based upon this, we can see how the managers of medium-sized sawmills perceive network co-operation as facilitating the achievement of a sustainable competitive advantage. The empirical data for this study were collected by interviewing 16 managers and employees in medium-sized non-integrated sawmills, a joint-venture marketing company and other co-operative partners. The findings of the study show that meaningful and beneficial co-operation partnerships exist in the Finnish sawmilling industry, but the sawmill managers do not perceive this collaboration as a strategic resource. The marketing company was the only firm in this study that relied on its co-operative networks in seeking a sustainable competitive advantage. To make more of co-operative partnerships, the principles of co-operative networking should be understood better in the sawmilling industry in order to know what to expect from co-operation. Furthermore, the managers should have the courage to engage in more extensive co-operation in order for strategic rents to materialize. Since the selection of the right partners is fundamental, further studies could be conducted on the reasons behind failed or terminated co-operative arrangements to gather further empirical knowledge in this subject area.

Keywords collaboration, social capital, strategic resources, competitive advantage, business processes
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1 Introduction

1.1 Industry Background

The business environment of the sawnwood producers located in the traditional boreal-zone forest-industry countries has changed in many ways over the last decade. Not least among these changes is the effect of new producers from low-cost countries, further increasing the competition for global market share, export tariffs on wood imposed by the Russian Federation and in some cases the introduction of restrictions on wood availability imposed through forest conservation programmes (see Hänninen and Kallio 2007, Solberg et al. 2010). Imperfect competition in the Finnish roundwood markets (Viitala 2010) is also likely to have affected independent sawmills negatively during the 2000s.

Historically, efforts to make sawmilling a growing business and to enhance its profitability have been mainly limited to issues concerning more optimal use of raw materials and increased production efficiency, although these methods have largely proved to be insufficient (Lähtinen and Toppinen 2008). In Finland, the efforts to enhance productivity have resulted in a considerable decrease in employment in sawmilling: in the 1980s there were 20 000 employees in the sawmill industry while by 2008 the number had decreased to 10 000 people. In comparison, in the same period the annual production levels varied between 7.3 and 10.2 million cubic metres in the 1980s and between 8.0 and 13.7 million cubic metres in the 2000s (Finnish Forest Research Institute 2010). The development of the sawmill industry does not affect only the operational preconditions of woodworking firms, since about two-thirds of the stumpage price earnings of non-industrial private forest owners in Finland are driven by selling logs to the sawmilling and plywood industries. Due to this, the decreased competitiveness of the wood products industry is a serious concern for maintaining economically sustainable forest management at a regional and local level.

The purpose of this study was to explore the importance and potential of network collaboration as a source of competitiveness in medium-sized Finnish sawmills. The data collection concentrated on medium-sized non-integrated sawmills with sawmilling as their main business (along with emerging bio-energy production) in contrast to sawmills integrated as part of the pulp and paper industry that operate as a sector of the overall business strategy of large corporations. The non-integrated sawmills produce over 3 million cubic metres of sawnwood and further processed products (Finnish Sawmill Association 2009). In the sawmill industry, the Finnish medium-sized sawmills represent 25–30% of the sawnwood production and 40% of the workforce (e.g., Lähtinen 2009).

1.2 Theoretical Review

In previous research, the strategic resource usage decisions made to enhance the competitiveness of sawmills have been addressed infrequently (see Cohen and Sinclair 1992, Korhonen and Niemelä 2005, Lähtinen et al. 2009). Lähtinen et al.'s (2009) main finding was that wood raw material did not create a basis for a sustained competitive advantage in large and medium-sized Finnish sawmills during the 2000s, while collaboration as a strategic resource was found to have a positive effect on the firm-level profitability and the multidimensional performance measure assessed by growth, profitability, cash flow, liquidity, solvency and obligations (see Committee for Corporate Analysis 2000). In recent national strategies and roadmaps for the wood products sector, the importance of networking as a factor for enhancing business success has also often been emphasized (see, for example, WoodWisdom 2002 and Puutuoteklusterin tutkimusstrategia 2008), but with less specific aims and means. Earlier research on sources of competitive advantage within other industries has also shown that business co-operation can be a significant source of competitive advantage (e.g., Varamäki and Vesalainen 2003, Pätäri 2010).

Business co-operation has the potential to increase flexibility, economies of scale and effective risk management and to facilitate inter-firm learning (Kogut 1988, Alvarez and Barney 2001, Harrison et al. 2001). However, understanding how co-operation is formed and managed requires the study of the actual processes within networks

(Barringer and Harrison 2000). Despite the results on the potential benefits of networking, so far there has been very little research assessing the competitive benefits of the network co-operation of Finnish sawmills, and only a limited amount of research on the creation of competitive advantages in the forest sector has been undertaken internationally (Niemelä and Smith 1997, Lähtinen 2007, Bonsi et al. 2008).

The competitiveness of a firm is affected by the conditions of the external business environment and the internal strategic choices made within the firm (Spanos and Lioukas 2001, McGahan and Porter 2002, Hawawini et al. 2003). In a competitive firm, there is a sufficient match between the requirements mandated by the external environment and the corporate strategy that is built on its internal firm-level resources and capabilities (Veliyath and Fitzgerald 2000).

According to the resource-based view (RBV) (e.g., Wernerfelt 1984, Barney 1991, Penrose 1995), tangible and intangible firm-level resources and the ability to coordinate these assets and production inputs in a strategically successful way (Helfat and Peteraf 2003) are considered to be the cornerstones of firm-level competitiveness. Achieving a sustainable competitive advantage (SCA) requires the possession of strategic firm-specific resources that are valuable, rare, imperfectly imitable and not easily substitutable (VRIN) (Barney 1991; see also Galbreath 2005). In addition, dynamic capabilities consist of coordination and integration of the firm's internal assets and external activities. Dynamic capabilities include buyer–supplier relationships and strategic alliances; the development of organizational routines, i.e., for collecting and processing information to link customer experiences with engineering design choices; the coordination of factories and component suppliers; and building organizational knowledge via individual and organizational learning based on such things as imitation and joint problem solving (e.g., Teece et al. 1997).

In the RBV, there are two assumptions helping to define the strategic resources that provide grounds for achieving SCA in a firm. First, different companies, even in a particular industry, may hold heterogeneous firm-specific resources. Second, the resources may be immobile across firms, meaning that they cannot easily be acquired, say from the markets or by imitation from competing firms (Barney 1991, Bonsi 2008). Possessing heterogeneous and immobile resources may create first-mover advantages, foster strategic group formation and enable the creation of market entry barriers (Porter 1980).

Inimitability and its attributes are a widely accepted concept in the RBV literature. The five sources of inimitability are *causal ambiguity*, referring to the complexity of relationships between resources, capabilities and competitive advantage; *path dependency*, providing important resources resulting from a firm's course in its historical development; *intellectual property rights*, such as patents and trademarks; *social complexity*, meaning formal and informal social relationships; and *time compression diseconomies* associated with resources that have been built with persistence and diligence in the course of time (Wills-Johnson 2008).

Strategic alliances are co-operative arrangements of companies aiming to enhance their competitive position and performance by sharing risks and resources, acquiring knowledge and gaining better access to markets (Hitt et al. 2000). In regard to inimitability, strategic alliances include many relevant characteristics by integrating the complementary resources of business partners to create value or by managing the company's alliance portfolio efficiently. In terms of competitiveness, co-operative alliances created to produce economies of scale tend to enhance company learning less than alliances based on complementary resources (Ireland et al. 2002). According to Barney (1991), the link between socially complex resources and competitive advantage is often identifiable, but because these resources are so complex, rivals cannot systematically imitate them.

Social capital is an essential element of building successful strategic alliances, meaning a company's relationships with other firms that possess important resources (Ireland et al. 2002). Social capital relates positively to the amount of resource exchange between companies (Tsai and Ghoshal 1998) and, although it can be understood as a common good or an organizational resource, it is built through networks of personal relationships and communication (Ireland et al. 2002). Compa-

nies may also seek partners with valuable social capital in order to gain access to the resources of existing networks (Chung et al. 2000). According to Glaister and Buckley (1999), the more diversity there is among the partners forming alliances, the more social capital is created. The internal division of work in a co-operative network indicates how complementary or overlapping the business partners' resources are within a network (Thorelli 1986).

A company can increase its knowledge and innovative capabilities considerably by putting the skills of other partners to use through the transfer of knowledge within and across the company boundaries. Successful transfers of knowledge between firms are, however, more complex than they are within one firm because of the diverse character of the cultures, boundaries and processes involved (Easterby-Smith et al. 2008). The ability to integrate knowledge from within or beyond a firm's boundaries is thus a distinctive organizational capability (Lorenzoni and Lipparini 1999). In addition, the degree of formality in co-operation may range from informal personal bonds (e.g., in loose development or co-operative circles) to different types of agreement and co-operative arrangements (e.g., project groups, joint ventures and joint units), in which a central factor of inter-firm arrangements is management control (Varamäki and Vesalainen 2003).

Since inter-organizational knowledge transfers concern two or more firms, there is a need to understand the conversational dynamics between the companies. Easterby-Smith et al. (2008) illustrate the complexity of a dyadic knowledge transfer in which the transfer process consists of the compilation of the resources and capabilities of both the donor and the recipient firm, the character of the knowledge being exchanged and the dynamics between the partnering organizations. The company's absorptive capacity must be increased in order to exploit fully the value-creating potential of the new knowledge (Shenkar and Li 1999). Absorptive capacity is a concept reflecting the ability to identify new, relevant external sources of knowledge and to digest and use them commercially (Cohen and Levinthal 1990). The recipient company's absorptive capacity is affected by its company culture and experience and the mechanisms of knowledge apprehension (Lane and Lubatkin 1998). The quality of a company's absorptive capacity also relates to its intra-organizational transfer capability in such a way that a firm can be good at absorbing knowledge from outside, but also needs to be successful at distributing the knowledge within the company.

The long-term objectives and outcomes of joint resource allocation can be set on a continuum according to various levels of intensity in regard to the time span of operations, the risk associated with common actions and the objectives of networking (for further discussion of the role of trust in maintaining and developing network co-operation, see, e.g., Wicks et al. 1999, Tomkins 2001, Varamäki and Vesalainen 2003).

2 Data and Methods

The empirical part of the research was carried out as a qualitative interview study. The primary data were collected by interviewing sawmill managers and employees and their business partners with the intention of finding out their perceptions and experiences regarding network co-operation as a source of sustainable competitive advantage.

The basis of the collection of the study sample and the selection of companies that utilize networks in their businesses was the data used by Lähtinen et al. (2009), consisting of large and medium-sized non-integrated Finnish sawmills. An example of an interview guide tailored for the managers of sawmills appears in Appendix 1. The aim of the data-gathering was to interview the general manager of each sawmill and then at least one of the managers responsible for wood procurement, production or marketing. Table 1 presents a list of the persons interviewed in four sawmills and in a joint-venture marketing company. Two of the sawmills are family businesses. Three sawmills focus on producing sawnwood and the fourth belongs to a corporation also involved in secondary processing of more value-added wood products. Furthermore, from the partnering companies, key personnel involved in co-operation, as identified in the sawmill interviews, were interviewed. All the interviews were conducted using face-to-face contact

Table 1. Interviewees and their positions in the companies.

Companies participating in the study	Interviewees according to their position
Firm A	General Manager Wood Procurement Manager Two Supervisors of Work
Co-operative partners	
Harvesting contractor	Manager/Entrepreneur
Manufacturer of product upgrades	General Manager
Firm B	General Manager Production Manager Mill Manager
Firm C	General Manager Wood Procurement Manager
Co-operative partner	
Production technology supplier	Technical Manager
Firm D	General Manager Production Manager
Marketing company E (co-operating with sawmills A and D)	General Manager Sales Manager

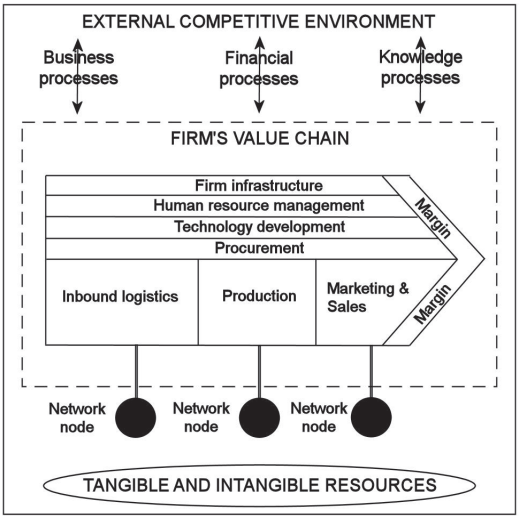

Fig. 1. Theoretical framework of the research, combining different theoretical approaches (Porter 1980, Barney 1991, Easterby-Smith 2009, Varamäki and Vesalainen 2003).

by the fourth author in January–March 2010, and lasted between 18 and 110 minutes with an average duration of 54 minutes.

The theoretical framework of the study (Fig. 1) is composed of multidimensional theoretical aspects combining the value chain perspective (Porter 1980), the RBV and dynamic capability views (e.g., Barney 1991, Teece et al. 1997) and networking theories (e.g., Varamäki and Vesalainen 2003, Easterby-Smith et al. 2009). Thus, a firm is considered in this study as conducting a range of activities to design, manufacture, market, deliver and align supporting services to offer products either within in-house activities or through active network nodes in collaboration with other companies. The operations of firms can be represented by using the value chain concept consisting of activities related to business processes that create value for products and services (e.g., Zairi 1997, Porter 1980, 1985) and that are further linked to the financial and knowledge processes of a company (e.g., Riahi-Belkaoui 2000, Turner and Makhija 2006).

In the empirical part, the theoretical concepts were operationalized by using semi-structured

interviews with a narrative perspective. The motivation for using narrative questions to collect the data was the fact that telling stories is a practical way for people to reflect upon themselves, the issues and their interconnections (Koskinen et al. 2005).

In common parlance, the narratives used in this study are known as stories, tales, cases and gossip as well. Due to their problematic measurability, narratives are usually studied qualitatively. Narratives can be in sound written form or can often exist as verbally suggestive, explicit and metaphoric forms that are evanescent in nature (Koskinen et al. 2005). It is fundamental to semi-structured interviews that the progress of the interview depends on certain key themes, which give the interviewee the freedom to speak freely. A semi-structured interview that takes into account the significance of people's opinions requires interaction (Hirsjärvi and Hurme 2000).

The data sample was categorized in this study by theory-based analysis, which is a traditional frame of analysis for natural sciences, in which theories are tested by analysing empirical findings. Theory-based analysis has the characteristics of deductive reasoning and it is based on existing theoretical frameworks (Tuomi and Sarajärvi 2002), i.e., in this study, the RBV, the value chain theory and network theories. It is assumed that co-operative networks and their relations to firm-level resources form entities that create a basis for gaining SCA in the markets. In this study, the extent of co-operative networks, firm resources and SCA is considered as a contextually bounded phenomenon affected by several factors.

The analysis of this study was based on utilizing a factual point of view that makes a distinction between the surrounding world and the arguments related to it. In the analysis, the focus was merely on what the interviewees said during the face-to-face contact, while the actual interview situations and their interactions were dismissed. Hence, a researcher choosing to employ the factual point of view is interested in the real behaviour of the examinees and their perceptions of what has happened (Alasuutari 1995) instead of interpreting the data as such. In analysing the data of this study, a central issue was to collect information and to learn facts concerning the investment, production, etc. linked to the actual sawmilling business. In addition, another crucial matter was to identify the informants' interpretations of the usage of intangible resources in the sawmills, especially through co-operational networks, to create SCA.

The interview questions for this study were formulated to capture a "meta-narrative" of the sawmilling business and the activities of sawmills' value chains, ranging from raw material procurement to marketing. Stories from each activity level were obtained by asking narrative questions such as "What co-operative partners does your company have in wood procurement?" and "Where did the co-operation start and why?"

The analysis matrix (Table 2), combining the applicable parts of the value chain model, the

Table 2. The data analysis matrix of the study.

	Raw material procurement	Production technologies	Sawing process	Bio energy	Product-upgrade process	Marketing
General description of the value chain	Description of the activity	Description of the activity	Description of the activity	Description of the activity	Description of the activity	Description of the activity
Human capital	Personnel and know-how	Personnel and know-how	Personnel and know-how	Personnel and know-how	Personnel and know-how	Personnel and know-how
Social capital	Trust and co-operation	Trust and co-operation	Trust and co-operation	Trust and co-operation	Trust and co-operation	Trust and co-operation
Machinery	Machines and devices	Machines and devices	Machines and devices	Machines and devices	Machines and devices	Machines and devices
Raw material	Raw materials and by-products	Raw materials and by-products	Raw materials and by-products	Raw materials and by-products	Raw materials and by-products	Raw materials and by-products

RBV and the network theories, was formulated in order to analyse the study sample and derive the research results. The primary activities of an SME sawmill's value chain (i.e., raw material procurement, production technology, sawing process, bio energy, product-upgrading process and marketing) were fitted to the horizontal axis. The vertical axis shows the general description of the value chains and the intangible (i.e., human capital and social capital) and tangible resource categories (i.e., machinery and raw materials), which were of particular interest in this study. Overall, the four sawmills had fairly similar value chains of primary activities including raw material procurement, production technology, sawing process, drying process, product upgrade process and marketing including domestic sales, export sales and customer relationship management. Only sawmill C manufactured product upgrades internally. Sawmills C and D had outsourced their wood procurement divisions into separate wood procurement organizations.

In the analysis matrix, intangible human capital included all the personnel and know-how needed to perform the primary activities within the value chains, while intangible social capital was chosen to include all the co-operation and trust needed to perform the activities in the value chains. In the tangible resource categories, machinery was defined as "the machines and equipment needed to implement activities within business processes", while raw materials were "the stock needed to manufacture products to be sold on the markets". In the sawmilling industry, both production technologies and raw materials have been found to be crucial to business processes (e.g., Lähtinen et al. 2009) and for that reason these two types of tangible production factors were specifically defined in the resource classifications.

The interview data analysis was conducted in two phases: the recordings of the interviews were listened to after the meetings, and the responses to questions were then summarized and coded. The research data were transferred in such a way that all the information on a certain firm was fitted into one matrix. The information was transferred by the activities in the value chain and the linkages between resource categories and activities. In comparison, the responses to value-adding questions described matters that could only be interpreted as concerning the whole value chain of a company instead of just one particular activity. Due to that, those responses did not fit into the matrix and they were analysed separately.

3 Results

3.1 Intangible and Tangible Resource Usage and Existing Forms and Features of Network Co-Operation in Sawmill Value Chains

The empirical interview results of this study related to resource usage in sawmills were fitted into the theoretical resource classifications introduced in the RBV literature (Table 3). The interview results suggest that the main factors of production emphasized by interviewees were related to managerial expertise, employee know-how and co-operation. Managerial expertise was found to be important both in individual sawmill activity and in value chains as a whole, while employee know-how was considered as especially important in production activities linked to production technologies, the sawing process and the sawing upgrade process. The role of co-operation was found to be a crucial part of production technologies in the sawing process and in marketing in particular, although it also had a certain role in wood procurement as well as research and development linked to value chains as an entity.

In contrast to intangible resources, the role of tangible production factors was emphasized mainly in the implementation of upstream value chain activities (Table 3), i.e., especially raw material procurement, production technologies and the sawing process. This is in line with earlier research (e.g., Bonsi et al. 2008, Lähtinen et al. 2009), in which tangible resources were found to be the "basic resources" needed to implement the forest industry core production processes, although as such they do not create a basis for achieving SCA.

Compared with other business process activities, the need for human and social capital, i.e., intangible resources, was found to be greatest in marketing and in integrating the separate activities into the whole value chain entity (Table 3).

Table 3. The theoretical RBV resource classifications (A) and their empirical counterparts (B) in this study by sawmill business process activity and at the level of the whole value chain.

Resources in the RBV literature (A)	Comparable resources used in activities of SME sawmill value chains (B)						
	Raw material procurement	Production technologies	Sawing process	Bio energy	Product-upgrade process	Marketing	Value chain
Intangible resource: ***Human capital – capabilities***							
Managerial expertise		Decision-making in production technology investments	Solving bottlenecks in production with personnel and business partners		Controlling production to adjust flexibly to changes in customers' orders	Negotiation skills with trading partners	Flexible business and production management
						Maintaining customer relations	Leadership and management skills
						Acting flexibly with business partners	Selection of activities to be performed in-house and activities to be outsourced
							Absorbing intra- and inter-organizational knowledge into organizational routines
Employee know-how		Judgement and control of technology for adding production value and flexibility	Transferring and transforming intra- and inter-organizational knowledge for production value-added and flexibility		Adjusting operations flexibly according to changes in customers' orders		Professional skills
Intangible resource: ***Social capital***							
Co-operation types		Co-operation in outsourcing services	Vertical co-operation in manufacturing			Buyer–seller and trading relationships	Participation in research projects
						Joint ownership of marketing company for export sales	Participation in R&D with a supplier
Operational reputation	Providing services in forest regeneration					Providing customer services	
						Reliability of deliveries	
Tangible resource: ***Machinery***							
	Using harvesting and transportation machinery of partnering contractors	Accessing suppliers' stock of spare parts	Utilizing partnering firms' production machinery in manufacturing				
		Employment of appropriate production technologies					
Tangible resource: ***Raw material***							
	Acquiring suitable wood species and dimensions			Suitable energy content of wood chips			
	Price of wood						

Capabilities related to marketing include multidimensional skills with trade partners and customers, while abilities linked to the value chains are related to integrating internal business process activities into strategic relationships with the external business environment, i.e., flexibility in serving customers, the selection of activities to be outsourced and the management of joint research projects with other companies.

The structure of sawmill co-operation was mostly dyadic and typically stemmed from the natural demand of firms for such things as investments in new machinery. The most durable co-operative relationships were found to be those in which the co-operative partners were interdependent on each other and those partnerships in which both parties felt they had a vested interest in continuing and even developing their co-operation. In this study, only two specific co-operative arrangements between sawmills described by Varamäki and Vesalainen (2003) were identified: a development circle (a joint research project including one sawmill and its co-operative machinery supplier) and a joint venture (a marketing company through which two sawmills export their products). In the development circle, the co-operative arrangement only had a marginal level of intensity, whereas in the joint venture the participants were deeply committed to each other on both sides and the benefits of co-operation were perceived to be of a strategic nature.

Although the sawmills studied were selected to represent a heterogeneous sample with their different production technologies, production volumes and geographical locations, the company managers interviewed were found to emphasize fairly similar issues in their co-operative practices. However, differences emerged along the value chain, illustrated in Fig. 1, linked to networking nodes of *inbound logistics* (i.e., raw material procurement in sawmills), *production* (i.e., production technologies in sawmills) and *marketing and sales* (i.e., marketing in sawmills).

In raw material procurement, the key co-operative partners of sawmills were identified as wood-harvesting contractors, private forest owners, forest management associations and competitors in integrated forest industry companies. The skilled wood-harvesting contractors were found to be the most important co-operative partners for sawmills since outsourcing the actual wood procurement to contractors allows sawmills to lower their raw material acquisition costs as a result of avoiding the need to invest in harvesting and transportation machinery or pay maintenance costs. Long-lasting working relations with contractors were pursued, because the quality of felling, harvesting and transportation operations powerfully affects the image of the sawmill as perceived by the forest owners, and thus impacts on the likelihood of conducting business with this sawmill in the future. One general manager explained that trust has increased on the sawmill's side with the increased independence, skill and working methods (cutting and harvesting instructions given by the sawmill management) from the contractor. He specified that reciprocity and flexibility towards the contractor in wage negotiation and a steady supply of work opportunities bring better service, functionality and reliability from the contractor. One general manager claimed that his company does not apply aggressive competitive bidding to contractors, which some of the integrated forest companies do. The contractors' compensation may be lower but the work still continues. The general manager explained the communication between his sawmill and the contractors as follows: "We have said to the contractors that as long as the sawmill has work, then the contractors will as well. But the contractors are realists: they understand that we cannot always provide them with work."

The role of trust in the relationship, with the private forest owners as well, has developed favourably as a result of successful repeated transactions, in which high quality in cutting, harvesting and transportation operations was seen as important. As an additional service component, the forest owners are offered provisional forestry regeneration services in connection with timber sales/purchases. The wood procurement manager also explained that some forest owners prefer a growing and local family business over "an integrated pulp and paper company which is closing down operations in Finland". In collaboration with integrated forest industry companies, the perceptions diverged and also expressed a lack of trust: "… We have confident relationships with those who after 20 years have started to appreciate us sawmills too, and in fact we are an important

partner for them. The only negative aspect is the fact that they have had price cartels with each other where they decide broadly how much they will pay for pulpwood and wood chips. Although the prices change from time to time, that is still what they are doing."

A general manager said of the way in which communication should be handled in the co-operative relationship: "In general, people and companies have an aspiration to do things well, but it requires that one knows what the other wants. It is essential that the division of responsibility has been precisely defined, in other words who is responsible for what is agreed upon. In addition, giving both positive and negative feedback is important."

Regarding production technologies, the companies confirmed their continuous co-operation with production technology providers. Specific co-operative partners included production and harvesting software providers, saw blade suppliers and hydraulics maintenance service providers, production design consulting companies and forklift leasers. Some sawmills also held lasting business contacts with local energy and district heating companies that buy woodchips, energy wood and other by-products to be burned as biofuels. The characteristics of service providers appreciated by the sawmills were geographic proximity, professional know-how and a reliable supply of spare parts.

At three out of four sawmills, long-term co-operation was found to exist with the machinery suppliers, who also maintained the machines, provided new spare parts and participated in the production planning and design. Only one general manager said that his company carries out continuous research and development with one of its machinery suppliers, but it appeared that some continuous maintenance projects were underway on a smaller scale with technology providers in all the sawmills. Co-operation concerning technology providers was mostly initiated as a result of the need for new machinery or servicing, which then led the mills to find an appropriate supplier or service provider on a longer-term basis.

According to the informants, trust between the machinery suppliers has developed over time based on sharing expertise and knowledge and as a result of good interpersonal relationships. Sometimes there was participation in joint development projects as well. One general manager even described the development of trust in machinery suppliers in an altruistic fashion: "In general they are loyal and they do not reveal the business of one sawmill to another, except where it would not matter. In fact it [disloyalty] could also be a good thing because if someone can make use of the information then one might get back something useful."

In export marketing, the key co-operative partners were sales agents with their large existing customer networks and their ability to find new customers. The most valued abilities of a good agent were loyalty, independence, good sales figures, responsibility and a way of putting a high priority on expanding businesses. However, agents with only average sales are faced with relatively low switching costs, and a recent phenomenon has been streamlining the agency network, whereby contracts have been terminated with a number of poorly performing agents.

In addition, the most important co-operative partnerships were direct customer contacts with wholesalers, trading houses and end-users. For example, most of the pine sawnwood products are sold to markets in North Africa and the Middle East through exporting organizations, which are similar to trading houses. The general manager of the marketing company said that "it is hard to get rid of the agents and trading houses because in every market there is an unique way of trading sawnwood products and in some countries customers want to do business only with a local representative". According to one sales manager "it is also difficult to get rid of trading houses because they serve several functions, for example, in Japan acting as financiers of industrial end-users, customers, organizers of warehousing and transportation. In addition there are sometimes problems in how to cope with the local languages."

A general manager commented on his co-operative partners as follows: "Theoretically, in sawnwood marketing one tries to get into more direct contact with the customers. But in practice, this is very difficult to arrange. When an agent is good and [co-operation] functions well, then it [the agent] has earned its salary and is worth more than its weight in gold. There are poor agencies,

but it is still the most immediate way to communicate and it provides a face with whom the customer can talk. The question is how to manage a network of agencies. There our own areas of responsibility are more important. It is a big part of our work, which is the reason why we are here at the sawmill's sales (department)."

In sum, the two most important factors addressed by company managers in their external co-operation were the development of trust and the reliability of operations, whether these mean delivery times, payment conditions or the quality of the raw material or end product. The managers interviewed had different co-operative partners at various stages of their value chains, which suggests that they prefer some co-operative partners over others.

3.2 The Importance of Network Co-Operation As a Source of Competitive Advantage

A superior ability to connect buyers and the available forest resources, the establishment of co-operative relations within the company (including the private contractors), flexibility in sawmill operations and the ability to respond quickly to changing customer needs were the four main areas brought up in the interviews as the main means of creating a sustainable competitive advantage. The managerial perceptions of company-specific dynamic capabilities between firms were quite similar, which might imply that what the managers thought of as their specific abilities were actually only a universal necessity in the sawmill business.

Regarding wood procurement, managers emphasized their co-operation with skilled private contractors and forest owners to secure access to a sufficient amount of roundwood at (or close to) the market price. From the perspective of cost management, the possibility of affecting raw material acquisition provides opportunities for enhancing short-term business performance. Since sawmills did not have any particular differentiation strategy in wood procurement, co-operation with forest contractors and forest owners seems to include only limited potential for raw-material-based creation of a longer-term sustainable competitive advantage.

In regard to production technologies, the processes in sawmills most suitable for creating value added for customers were related to operational flexibility: making custom-made products and customer-oriented dimensions, making precisely the lengths, qualities and volumes wanted by customers and making changes to existing orders at a late stage close to product delivery. In the long term, this capability enhances the creation of added value for customers, gaining a sustainable competitive advantage (see Stendahl et al. 2007).

In marketing, speed and efficiency of services were stressed in the interviews as the strategic resources needed for creating a competitive advantage. A general manager put it this way: "In today's markets there is fierce competition and urgency about who gets the deal. An organization that is capable of systematically and quickly taking care of and carrying out the process through production all the way to making the buyer an offer has an advantage. However, always being systematic and quick isn't going to help if the prices differ a lot from the [lowest] competitor's price." A general mill manager described his company's core business ideology in the following way: "We are a small and flexible producer. Likewise we willingly take customers that are small and medium-sized industrial end-users, planing mills, glue sheet and glue-lam manufacturers. By flexibly providing the customers with the kind of products they need, we have focused on particular products and markets where we have the right product and where we are known. Additionally, the customers have been given surplus value during the two last years by giving them extra credit to pay for the goods."

The importance of social capital in sawmill co-operation and the benefits and strategic role of networking relationships for businesses are illustrated in Table 4. Table 4 indicates that long-term relationships developing trust-building among co-operative partners are the most crucial characteristic of social capital in the networks of these sawmills. The strategic importance of co-operation in value chain activities grows when proceeding from the upstream activities of value chains (i.e., raw material procurement) to the downstream activities where the ability to create and sustain customer contacts is required (i.e., marketing). In terms of the strategic planning

Table 4. Social capital used in the sawmill in co-operation and the benefits achieved by networking.

	Social capital used in co-operation	Benefits for business activities achieved via co-operation	Importance of co-operation in searching for competitive advantage
Raw material procurement	Mutual trust between sawmills and forest contractors/private forest owners developed in the course of time based on good quality of work	Opportunity to outsource wood acquirement to contractors Opportunity to support good reputation by providing regeneration services for forest owners	Opportunity to lower the raw material acquirement costs as a result of no need to invest in logging machinery
Production technologies	Good interpersonal relationships and mutual expertise that have created grounds for mutual trust	Reaching professional know-how enabling good availability of maintenance services as well as production planning and design	Capability of developing processes to enhance flexibility and reliability of operations and increase customer value
Marketing	Long-term relationships between sawmills and sales agents with large customer networks	Opportunity to meet large existing customer base, achieving good sales results and expanding business	Long-term benefits based on the ability to serve customers efficiently and quickly

of sawmills, cost competitiveness affected by co-operation in raw material procurement has a crucial impact on business sustainability, while the ability to add value to products and services separates a firm from its competitors and enables it to set prices that are above the level of standard commodities (see McNair et al. 2001).

The interviews show that meaningful and valuable co-operation partnerships exist in the Finnish sawmilling industry, but in general the sawmill managers did not perceive this collaboration as a strategic resource. The two managers of the joint marketing company were the only ones to claim that they base their sustainable competitive advantage on their co-operative networks. The interviews also suggest that the sawmill managers felt that the company relations were important to the business and that they were value creating, rare and a consequence of path dependency, which directly follows the VRIN terminology used by Barney (1991). It is thus quite possible that there is more of a rhetorical difference in what the strategic resources as a concept really represent for these managers. In this case, our results indicate that in this particular group of medium-sized sawmills inter-firm collaboration between sawmills actually includes elements of and the use of collaboration for creating sustainable competitive advantage.

4 Discussion

The strategic potential of inter-firm co-operation to enhance competitiveness has been emphasized in the strategic management literature (e.g., Kogut 1988, Alvarez and Barney 2001, Harrison et al. 2001, Willis-Johnson 2008). Similar findings have also been reported in the forest industry, although the number of empirical studies is low, even in an international context (see Niemelä and Smith 1997, Lähtinen 2007, Bonsi et al. 2008). The deficiency of the previous research related especially to the Finnish sawmilling sector is the lack of information on the business network formation processes, their functioning and the perception of company managers of the strategic usefulness of co-operation in seeking SCA.

In this study, managers and co-operation partners in four medium-sized non-integrated sawmills were used to represent the sawmilling industry in Finland. The interview data indicated that managers in companies emphasized fairly similar issues in their co-operative practices, some of which can be typically found in several other sawmills as well. However, some differences emerged along the value chain. The strategic importance of co-operation in value chain activities grows when proceeding from the upstream activities of value chains (i.e., raw material procurement) to the

downstream activities where the ability to create and sustain customer contacts is required (i.e., marketing). However, although product upgrading has been seen as an important factor in gaining SCA in the sawmilling industry (e.g., Stendahl et al. 2007), the results of this study did not provide any further evidence of sawmill co-operation in product-upgrade processes.

The findings of this study show that meaningful and beneficial co-operation partnerships do in fact exist in the Finnish sawmilling industry, but the sawmill managers do not perceive this collaboration as a strategic resource. Not entirely unexpectedly, the managers of the joint-venture marketing company were the only ones in the study to claim that the creation of sustainable competitive advantage was dependent on the company's co-operative networks. At the moment, the emphasis on partnerships among sawmills is still in its infancy, mainly in developing technologies and improving process performance with machine providers, while the higher-level collaboration forms introduced by Varamäki and Vesalainen (2003) are not present. This finding is similar to conclusions drawn by Pätäri (2010), for instance, in the emerging bioenergy industry, in which forest and energy companies have not yet entered into bioenergy-driven value-creating inter-firm relationships to a large extent.

The use of the qualitative interview method to analyse business networks in the four case sawmills and their collaborating partners was justified by the exploratory nature of the research, and at this stage care should be taken in generalizing the results beyond this sample to the medium-sized sawmills in Finland. However, despite the number of interviews in the study not being particularly high (16), the data and findings drawn from it saturated during the research process, so the present sample was likely to be sufficient. In the study, careful documentation was also used to ensure the reliability of the results. During the interviews, the questions were thoroughly explained in the case of unclear interpretation of concepts. To increase the construct and external validity, the same questions were addressed at different stages of the sawmilling value chain and multiple experts were interviewed in all the companies. The internal validity was later increased by grouping the data based on the theoretical framework of this study, and the framework of the study was found to explain the empirical features of the data (Yin 1994).

When seeking strategic co-operation to achieve sustainable competitive advantage in sawmills, a better understanding of the expectations set by the partners for business networking is needed. Furthermore, the managers should have the courage to engage in more extensive co-operation in order for the strategic benefits to be realized. This unrealized potential underlines the importance of relating development targets to individual research, development and networking projects. As an example, the current lack of co-operation in product-upgrading processes suggests new opportunities and options both in efficiency seeking and in value-added creation, e.g., in secondary processing (see also Lähtinen and Toppinen 2008). Since the selection of the right partners is fundamental, further studies could be conducted focusing on unsuccessful or terminated co-operative arrangements in the sawmilling industry to provide more empirical insights into this subject area. The role and mechanisms for the creation of trust should also be researched using a larger sample to obtain more generalized evidence, while the use of both surveys and a qualitative methodology such as focus groups would also be appropriate.

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Appendix 1. Interview guide for sawmill managers and personnel.

Introduction: Position and duties of the interviewee?

Acquisition and use of current production technologies
From where and how does your company acquire its production technologies?
How do the new and reinvestment decisions arise?
How is the machinery and equipment maintained? Do you have a lasting relationship with manufacturers of machinery or equipment? If yes, then: where did the co-operation begin and why? What is the nature of the co-operation? How has trust originated and developed? What is the division of responsibility between you and your business partner?
Have you conducted production technology related research and development?
If yes then: Has it been conducted in co-operation with a machinery manufacturer? How have your firm's production needs been taken into account?
As a firm do you consider that you have gained benefits from the way you manage relations with your co-operative partners relating to production technologies?

Stages of production of the firm in...
...wood procurement?
How is the raw material procurement organized in your firm? What factors of production do you utilize? Where do you sell unsuitable raw materials? What co-operative partners does your company have in wood procurement? Where did the co-operation begin and why?
...sawnwood manufacturing?
How is the sawnwood manufacturing organized in your firm? What factors of production do you utilize? How do you use the by-products of the production process? What co-operative partners does your company have in sawnwood manufacturing? Where did the co-operation begin and why?

Manufacturing of value added products
How is the manufacturing of value added products organized in your firm? What factors of production do you utilize? How do you use the by-products that develop in the manufacturing of product upgrades? What co-operative partners does your company have in manufacturing of product upgrades? From where did the co-operation begin and why?

Bio energy / Heat production
Does your firm have an own bioenergy / hear production or are you a share owner in a heating plant? When did the bioenergy / heat production begun and are there any expansion plans? What factor affects the expansion plans? How is the bioenergy / heat production organized in your firm? How do you use the by-products? What co-operative partners does your company have in bioenergy / heat production? Where did the co-operation begin and why?

Marketing – domestic sales/exports
How would you describe the significance of personnel know-how, leadership and co-operative relations in your domestic sales/exports? What co-operative partners does your company have in domestic sales/exports? Where did the co-operation begin and why?

Customer relationship management

How would you describe personnel know-how, leadership and co-operative relations meaning in your customer relationship management operations? What co-operative partners does your company have in customer relationship management? Where did the co-operation begin and why?

Value added creation

What processes in your business operations have turned out to be most successful in transforming inputs (knowledge, finance and strategy) into customer value? Have you got direct feedback from customers concerning your firm's special abilities, where and why? Have you developed your special abilities based on your co-operative relations? What aspect of your firm's co-operative relations have turned out to be the most important factor for your company? What would you consider it to be for your co-operative partner?

Is there something in your firm's co-operative relations that is untypical in the industry? Has it been especially important in your firm's business? Value adding? Rare? Inimitable? Irreplaceable?

Finally: In what direction do you consider Finnish sawmill industry will develop in the next five years? Is there something you would like to add?