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## Defining the systemic development of the Finnish pulp and paper industry's business network

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### Highlights

- Systemic view helps to understand the phenomena reshaping business field networks.
- Forest sector companies operate in complex, dynamic, and international environment.
- Actors-Resources-Activities framework -based analysis of Finnish pulp and paper industry's network development.
- The role of actors, resources, and activities have varied between different phases.
- Network structure altered due to radical changes in the operating environment.

### Abstract

Companies operate in a nested and complex system where global challenges shape their environments and put pressure on business activities. Systemic understanding of the past and ongoing changes within a national industry help to analyze the global influences and identify phenomena that reshape business collaborations. To address this issue in the case of a forest sector, this study constructs a systemic picture of the historical development of the Finnish pulp and paper industry's business network and analyzes it qualitatively through the Actors-Resources-Activities framework. Books discussing the history of the Finnish forest industry were used as secondary data, which were analyzed with a theory-based content analysis method. The analysis revealed four development phases during which the network has evolved from rather simple one emphasizing cooperation organizations (1st) to a more complex one with stronger roles of the state and individual influencers (2nd), and then emphasizing export and advocacy associations (3rd), before returning to be rather simple, based around three large multinationals and the EU playing an important role (4th). The industry is concerned about securing its key resources, with varying foci. Research and technological innovation activities play an important role together with cooperative interactions. Overall, actors favor a business-as-usual strategy, which is overruled only by a radical change in the operating environment, leading to notable changes in the network. Thus, a suggestion for all actors within the forest sector is that actively detecting and interpreting change signals in the whole environment can help actors in pursuing sustainable activities.

**Keywords** Actors-Resources-Activities framework; competence; coopetition; forest cluster; historical pathways

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## 1 Introduction

The global operating environment for forest companies has evolved into a nested, dynamic, and complex system, which is characterized by continuous interaction between different actors with blurring sectoral boundaries (Håkansson and Snehota 2006; Vargo and Lusch 2011; Möller et al. 2020). The highly topical megatrend of sustainability (Mittelstaedt et al. 2014), global environmental challenges, such as climate change (IPCC 2014) and biodiversity loss (Secretariat of the Convention on Biological Diversity 2020; Dasgupta 2021), coupled with the emergence of green and sustainable consumption and consumer behavior (Rametsteiner et al. 2007; Milfont and Markowitz 2016) all affect the operating environment. Similarly, the notion of planetary boundaries (Rockström et al. 2009) is shifting the view of sustainability toward being nested, meaning that the economy is dependent on society, and these are both dependent on the environment (Folke et al. 2016; Dasgupta 2021). These drastic changes have already impacted the global forest sector, and moreover the pulp and paper industry. For example, the decreasing demand for old products, such as communication paper, has resulted in ongoing structural change within the industry (Hetemäki and Hurmekoski 2016). Similarly, the market for industrial products has developed from being a seller's market, where supply is lower than demand (in the 1950s and 1960s), to a cut-throat, competitive market where the supply of products is much higher than demand (1990s and 2000s) (Kanderlbauer et al. 2012). In general, the use of forest biomass and its effect on carbon sinks and biodiversity and overall sustainability have been widely discussed (Kröger and Raitio 2017; Eyvindson et al. 2018).

Changes in the operating environment are contributing to a sustainability transition and a shift toward circular bioeconomy where fossil-based resources are substituted with sustainably sourced and efficiently used and reused bio-based resources (Hetemäki et al. 2017; D'Amato et al. 2020) and where companies should have innovative and sustainable business models (Bocken et al. 2014; Evans et al. 2017). This has brought the sustainable and versatile use of forests back into focus. For example, the European Union is showing a strong political desire for a transition toward sustainable circular bioeconomy where forests play a key role as a common resource-base (EC 2021). Similarly, in countries with great forest reserves and strong industrial actors such as Finland, forest ecosystems as a whole are expected to continue generating economic wealth while offering ecological benefits in a sustainable and responsible manner (TEM 2021).

The Finnish forest industry, and moreover, the pulp and paper industry, is expected to retain its important role in the circular bioeconomy as most of the promising bioeconomy innovations substituting fossil-based products are related to wood-based pulp and its upgrades (Hurmekoski et al. 2018). Similarly, the Finnish pulp and paper companies are important actors on a global scale, as the three largest companies are included in the top 100 in the global pulp and paper market in 2019, where Stora Enso and UPM are in the top ten (Newton Consulting Partners 2022). Additionally, from a historical perspective, the whole forest industry has long had an essential role in Finnish society and the national economy (Sajasalo 2002) by integrating Finland, a small and open economy (Ojala et al. 2006), into international business systems (Kuisma 2006), and this has made forests the most important resource-base for the Finnish business system.

However, the pulp and paper industry is facing many challenges in the transition, as these large companies are characterized as mature (Guerrero and Hansen 2018) and strongly path-dependent (Näsi et al. 2001; Luhas et al. 2019) and therefore, following dominant business logic, i.e., the established ways of managing business activities and strategic decision-making (Prahalad and Bettis 1986). In the pulp and paper industry, the business logic has focused on producing large amounts of traditional products, materials, and energy in traditional networks with traditional business models. The emerging sustainable business logic challenges the pulp and paper industry to consider reconfiguring their business networks and value creation logic to adapt to changes in the

utilization of forest resources and opportunities arising from the new products and services (Bocken et al. 2014; Evans et al. 2017; Hetemäki et al. 2017; Karvonen et al. 2017; Möller et al. 2020).

## 1.1 Previous research, rationale, and research questions

Previous research conducted on the forest industry has focused on historical and future development of the industry with approaches from marketing management theories, such as strategic orientations (Rusko 2011; Toppinen et al. 2013), internationalization (Toppinen et al. 2006), and competitiveness (Lamberg et al. 2017), where the focus is on companies and results have been generalized on an industry level. A recent literature review has studied the development of innovation research within forestry and forest-based industries (Weiss et al. 2020). In addition, the forest industry has been studied along with other industries related to customer asset management (Nenonen and Storbacka 2016) or as being a part of a business network related to sustainable business practices (Tura et al. 2019). Foresight studies have researched how the forest industry may look in the future (Hämäläinen et al. 2011; Hetemäki 2014), how sustainability issues affect the industry's transition to bioeconomy (Pätäri et al. 2016), and how companies in the forest-based sector see their sustainable business models in the future (Näyhä 2021). In Finland, research has focused on the economic, political, and social history of the Finnish forest sector with theories applied from history sciences. A large amount of research is done in Finnish (Kuisma 2006; Pakkanen and Leikola 2011) and accompanied by studies in English, e.g., on the economic history of the forest industry (Järvinen et al. 2012) and historical firm-level strategic decision-making (Lamberg and Peltoniemi 2020).

The rationale of this study is to scrutinize the systemic phenomenon related to changes in the operating environment and how they affect and reshape the pulp and paper industry. Therefore, the research design of this study is based on a qualitative intrinsic case study (Stake 1995) with a constructive approach (Kasanen et al. 1993), accompanied with historicism (Fullerton 1987) and phenomenon-based research (Schwarz and Stensaker 2016). With this research design, we aim at creating theoretical and practical understanding of the phenomenon and how it can aid forest sector companies in coping with different challenges and answering the needs of sustainable circular bioeconomy. Thus, the theoretical novelty of this study is to construct a mid-range theory (Brodie 2017) for forest-based business network studies where marketing management theory, and moreover business network theory, is combined with historical documentation on the pulp and paper industry. Incorporating a systemic perspective into studying the pulp and paper industry brings new insights in understanding the complex operating environment as connections between actors and issues where the sum is more than its parts. Recognizing the role of relationships, reciprocal interactions, and institutions in business activities and value co-creation can help forest-based companies to find their sustainable competitive advantage. When preparing for the future, it is important to understand what kind of networks existed in the pulp and paper industry, and through what kind of developments and turning points it has evolved and transformed.

The objective of this study is to construct a systemic picture of the historical development of the Finnish pulp and paper industry's business network.

Thus, the research questions are:

1. How has the Finnish pulp and paper industry's business network developed?
2. What internal and external events have triggered the network to change?

The rest of the paper is organized as follows. First, the conceptual framework of the study is outlined. After that, the research materials and methods are introduced, followed by the results. Lastly, the findings and potential implications are discussed as well as the limitations of this study and suggestions for further research.

## 2 Dynamic business networks in the context of nested business environment

The dynamic and complex business environment has a spatial and temporal structure, where relationships evolve over time and the current state of the relationship is the outcome of previous interactions between actors and the social, political, and economic institutions affecting them (North 1990; Håkansson and Ford 2002; Vargo and Lusch 2011; Möller et al. 2020). This environment is seen as a (business) network, which is an emergent structure of embedded relationships bonding actors, tying resources, and linking activities together (Håkansson and Snehota 1995). According to this dynamic perspective, a business network is never ready, it cannot be purposefully created, and actors cannot manage it. The focus in investigating business networks is on the network's deep structure and how it evolves and adapts to critical events in the environment (Halinen et al. 1999; Håkansson and Ford 2002; Möller 2013; Ojansivu et al. 2020).

In this study, a business network is defined as a dynamic structure of relationships between directly and indirectly connected interdependent actors and is characterized through interaction and resource integrating activities performed by these actors. The Actors-Resources-Activities (ARA) framework, by Håkansson and Snehota (1995), offers a conceptual language for describing and analyzing business networks and their value co-creation. The ARA framework has a strong standing in network research and thus has been widely utilized in many studies over the years, for example, in describing the business network of the Polish furniture industry (Ratajczak-Mrozek and Herbec 2013) and the Japanese seafood distribution system (Abrahamsen and Håkansson 2012). In addition, in more recent studies, it has been utilized to describe how servitization and provisioning of solutions in the transportation industry is embedded in business networks (Hedvall et al. 2019), how firm-specific resources and tailored activities influence the relationship performance of Japanese industrial manufacturers (Choi and Hara 2018), and how actors operate as key drivers in sensemaking and network development after industrial restructuring (Lundberg et al. 2016).

Actors are economic, social, or political entities that utilize resources in value co-creation (Håkansson and Johanson 1992). They are constrained by social, economic, and political institutions (North 1990) and institutional structures which guide their behavior (Ojansivu et al. 2020). Actors have different knowledge, perceptions, capabilities, and power within the network, and bonds between actors affect how they perceive, evaluate, and treat each other (Håkansson and Snehota 1995), and thus, even though the business network cannot be managed, capable actors can try to affect the network by being proactive and influencing other actors (Medlin and Törnroos 2014).

Resources can be tangible and intangible. Intangible operant resources (e.g., knowledge, competence) are dynamic and capable of creating value and acting purposefully on other resources, for example, tangible operand resources (e.g., goods, raw materials) (Vargo et al. 2008). Resources are controlled by actors who need resources to perform activities (Håkansson and Johanson 1992), thus availability and control over resources affects an actor's success and the sustainability of its activities (Barney 1991; Hart 1995). This is especially important when activities are strongly based on the use of natural resources. Resources should be managed and sourced in a manner that covers all sustainability dimensions, economic, social, and environmental, in order to mitigate the consequences for the environment (Eyvindson et al. 2018). No actor alone has all the resources needed – relationships between actors are a way to access, acquire, and gain control over resources, thus relationships tie resources together (Håkansson and Snehota 1995). A resource only has value when there is a known use for it and the use and value of resources are dependent on how they are combined and integrated with other resources (Barney

1991; Håkansson and Snehota 1995). This makes social capabilities (Tate and Bals 2018) and knowledge-based resources (Mouzas and Ford 2012), and the ability to integrate them, crucial for actors. Therefore, everything and everyone can be a resource when it is incorporated into the resource integration process (Löbler 2013).

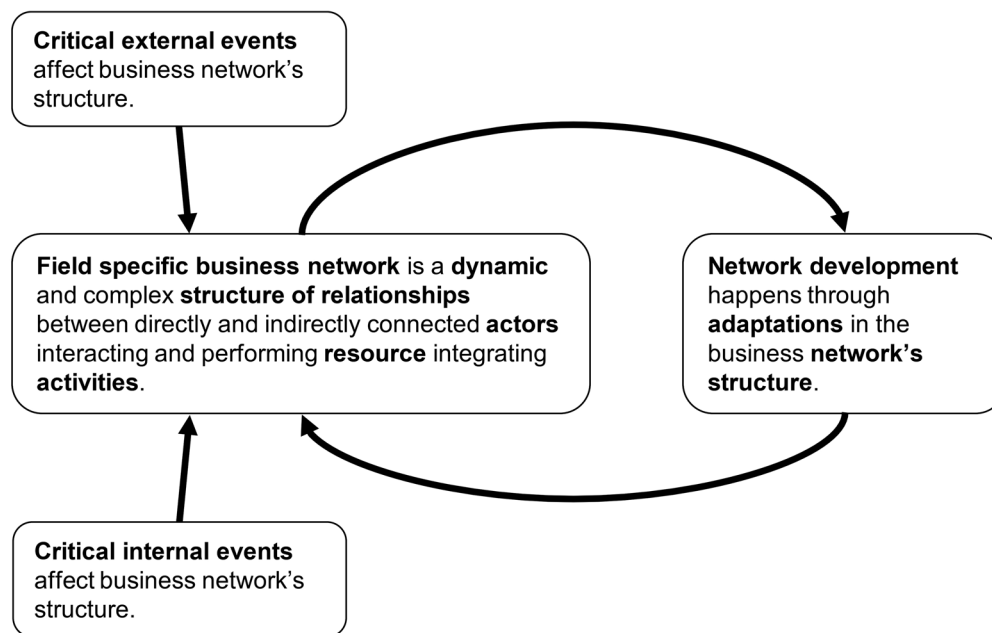
Actors perform purposeful resource integrating activities. Activities are technical, administrative, commercial, and any other activities that can be connected to other actors' activities (Håkansson and Snehota 1995). To perform activities, actors utilize and integrate resources to create new resources by combining, developing, or exchanging them (Håkansson and Johanson 1992), which makes activities connected and dependent on the integration of resources (Bankvall 2014). Activities are modified, adapted, or related to other activities through interaction between actors in the network and thus, relationships link activities together (Håkansson and Snehota 1995). In order to perform sustainable activities, a social perspective in the value co-creation has to be considered, where the role of social exchange processes in relationship governance and development (Bondeli et al. 2018) are highlighted together with taking a wider view on stakeholders to include not only economic, but also environmental and social stakeholders (Tate and Bals 2018).

Due to the dynamic nature of business environment, a business network's structure is under a constant pressure to change. According to Halinen et al. (1999), changes in a network emerge at a dyadic, single relationship level, but depending on the magnitude of the change, it can affect only that dyad or spread along the whole network. To understand the reasons behind change, it is important to detect internal and external impulses and incidents, i.e., critical events, in the environment that trigger the network change (Halinen et al. 1999). The internal change factors arise from the actor, such as learning and new relationships, for instance, in the case of the emergence of a Swedish biorefinery initiative where key actors played decisive roles (Lundberg et al. 2016). External change factors, on the other hand, arise from the network and its environment, such as general economic conditions and social, technological, and cultural developments, for instance, in the case of the development of the Japanese fish distribution system (Abrahamsen and Håkansson 2012).

A network's historical change is understood through evolutions in society caused by institutional change (North 1990) where institutions can either slow down or speed up the change process (Matthyssens et al. 2013). Regardless of the cause of change, actors across the whole network must adapt to them, and thus the deep structure of the network is reconfigured (Håkansson and Snehota 1995; Halinen et al. 1999). Therefore, it is important to notice that adaptations and changes do not only happen at the company or business network level, but also at the so-called macro, i.e., the socio-economic-technological, level (Keränen et al. 2021). Consequently, in this study, we view the dynamic business environment as nested and described through four interrelated layers of actor, focal ecosystem, business field and socio-economic-technological system (Möller et al. 2020).

In this study, we observed the development of the Finnish pulp and paper industry's business network from the business field layer, as we see that the industry specific institutions, structures and technologies guide and influence interactions and activities within the business network (Möller et al. 2020). According to the conceptual framework of the study, the structure of the pulp and paper industry's business field specific business network is under constant pressure to change due to critical external and internal events happening on different nested layers of the business environment (Fig. 1). The development of the business network happens through adaptations in the network's structure, i.e., actors, resources, and/or activities.





**Fig. 1.** The conceptual framework of the study is constructed around analyzing a dynamic business field specific business network. Critical external and internal events affect the network's structure and network development happens through adaptations in the network's structure, i.e., actors, resources, and activities.

### 3 Research materials and methods

#### 3.1 Research methodology and data analysis method

The research methodology follows an intrinsic case study method (Stake 1995) with a constructive approach (Kasanen et al. 1993) accompanied with historicism (Fullerton 1987) and phenomenon-based research (Schwarz and Stensaker 2016). While an ordinary case study investigates cases with an aim to learn about a certain problem and create generalizations based on that, an intrinsic case study is more interested in the case itself, its uniqueness, and particularities. Thus, we aim to create understanding about a practically relevant and intrinsically interesting case, the development of the Finnish pulp and paper industry's business network, as it represents a phenomenon where uniqueness is embedded in the context (Stake 1995). In addition, a constructive approach was applied as the study aimed to construct development phases of the business network with connections to marketing and networking theories (Kasanen et al. 1993) and the constructed networks were interpreted through their social, economic, historical, and technological context (Stake 1995). Because an industry's network is a complex and nested social system evolving over time and context, approaches from historicism (Fullerton 1987) were applied. The network can be seen as a historical individual with its own time-bound identity, values, attitudes, and conditions guiding its development. It is important to note that the constructed case is a result of analytical reflections of the data (Stake 2005) and chronological developments within the case over time (Stake 1995) and thus, does not represent a universal truth about the topic. Instead, the research builds new knowledge and constructions on the researched phenomenon by explaining it through a conceptual framework, and thus a phenomenon-based research approach was applied (Schwarz and Stensaker 2016). Thus, the core aim of the study was to construct a mid-range theory where context-free general theories and knowledge about them are linked with knowledge gained from

context-specific empirical research (Brodie 2017). This theorizing offers practically relevant real-life knowledge intertwined with broader theoretical conceptualizations to be utilized and applied in studying forest economics.

The data analysis follows a qualitative document analysis method (Bowen 2009) along with a qualitative meta-analysis (Timulak 2009) and a qualitative deductive directed content analysis (Hsieh and Shannon 2005). In qualitative document analysis, documents are reviewed and analyzed in a systematic manner (Bowen 2009) and in a qualitative meta-analysis, primary qualitative documents on a certain topic are analyzed thoroughly to get a comprehensive picture of the researched topic (Timulak 2009). A meta-analysis of documents is especially useful when studying past developments and changes on a topic where vast amounts of different documents are available (Bowen 2009). In a qualitative deductive directed content analysis, the constructed conceptual framework is utilized to direct and guide the research process, from drafting the research questions and creating initial codes for the data analysis to reporting and discussing the research findings (Hsieh and Shannon 2005). In addition, it enables a validation of the conceptual framework to be used in future studies (Hsieh and Shannon 2005) as we wanted to construct a mid-range theory for studying forest-based business networks through the concepts of the ARA framework (Håkansson and Snehota 1995) and change in business networks (Halinen et al. 1999). To verify the validity and repeatability of the findings, the authors conducted a data triangulation process where many different types of documents were used as data sources (Stake 1995) for data selection and analysis. In addition, the authors conducted a validity check by discussing and cross-checking the interpretations, reflections, and meanings derived from the data.

### 3.2 Data selection and collection

The selected secondary dataset was based on documents discussing and analyzing the history of the Finnish forest sector as a single entity (Table 1). More detailed information on the selected data sources can be found in Supplementary file S1, available at <https://doi.org/10.14214/sf.10599>. There were two rounds of data selection and collection: the first in summer 2017 and the second in autumn 2021. During the first round, the main sources of data were the series of books ‘Land of forest industry’, including five books that construct a general overview of the development of the Finnish national system based on forest resources (Kuisma 2006) and one book ‘Tar, board and paper’ that shows the significance of forests and forest-based industry in Finland’s economic development (Pakkanen and Leikola 2011). These two data sources were chosen because they offer a comprehensive set of primary studies, presenting a reliable and systemic picture of the historical

**Table 1.** Description of the document types and number of documents selected as the secondary dataset for analyzing the development of the Finnish pulp and paper industry’s business network

Type of document	Number of documents (n = 31)
Book, Finnish	10
Book, English	3
Book chapter	2
Report, Finnish	2
Report, English	1
Journal article, Finnish	2
Journal article, English	11

development of the Finnish pulp and paper industry as a single entity, and how different aspects are linked to each other from multiple perspectives. Although these books have not been put through a peer-review process, they are based on a vast amount of different data sources from peer-reviewed journal articles to archives, company history reviews, newspapers, memoirs, and other types of documents. Similarly, many peer-reviewed journal articles cite these books. In addition, three more books were used as data sources for in-depth knowledge on topics which were lacking in the main data sources. The book 'The green kingdom: Finland's forest cluster' by Reunala et al. (1999) offered more insight on the Finnish forest cluster, the book 'Power and twist in forest policy: from 1970's to the needs of 2000's' by Viitala (2004) offered more on the development of forest policy in Finland, and the book '100 years of Forest Management Associations: forestry servant for one million people' by Viitala (2006) provided more knowledge on forest owners and actors related to owning and managing forests.

The purpose of the second round of data selection was twofold: to reach data saturation and to add recent topical publications as data sources. The documents were identified via the University of Eastern Finland Library service, UEF Primo, in which one can search printed and electronic materials in the university library's collections as well as the Internet. The search terms were combinations of words, e.g., Finnish forest industry, forest sector, pulp and paper industry, history, evolution, and development. The search was conducted in Finnish and in English. In addition, snowball sampling was used. Document selection emphasized documents discussing the historical business development of the Finnish forest industry, cluster, or sector, but policy-related documents were also chosen. The intention of the data selection was to emphasize peer-reviewed journal articles, but books, book chapters, and reports in Finnish and in English were also included. In this study, by data saturation, we mean that any new documents either contained the same information or findings as previously selected documents or cited the same studies as already selected.

### 3.3 Process of data analysis and construction of systemic pictures

The conducted qualitative meta-analysis followed the four-phased descriptive-interpretative approach (Timulak 2009). During the first phase, the books and other documents were read, and extensive summary notes were written in a text file by the first author during summer 2017. These summary notes were written to represent the key concepts, critical events, and network structure (i.e., domains), of the conceptual framework. The notes were downloaded to QSR NVivo 12 qualitative analysis software for further analysis. During the second phase, the initial coding of notes (i.e., creation of meaning units) under corresponding domains was conducted in NVivo. The initial coding was done to get the approximate 150 pages of notes into a more categorized form. Initial analysis of the data was done simultaneously to initial coding and thus, four development periods were identified.

In phase three, more precise recoding was done following the domains and initial analysis of the data. The four identified development periods were utilized to construct four systemic pictures (i.e., phases). During recoding, meaning units were divided into categories that represented a development period (e.g., years 1860–1920). The categories under a domain were as follows. A domain of critical changes with categories of 1) external events and 2) internal events, and a domain of network structure with categories of 1) actors, 2) resources, 3) activities and 4) general issues. During the fourth and last phase, findings were interpreted and synthesized by constructing and naming the dominant systemic phase of each time period. Lastly, the phases were visualized as networks.

In addition, a complementary round of data analysis was conducted after selecting and collecting additional data to improve data saturation in autumn 2021. The documents were analyzed by



comparing them to the initial findings; identified critical events, systemic phases, and constructed networks. Thus, rather than a detailed in-depth analysis, the second, complementary data analysis served as a validity check for the interpretations, reflections and meanings reached during the first data analysis. This further analysis resulted only in a minor addition to the constructed networks: shareholders were noticed to be one important actor within the role of stakeholders during the fourth phase.

The construction and reconstruction of the phases was based on a cumulative process of internal and external changes in the operating environment. Therefore, the time period for each phase is not a certain year range but rather a series of years during which the change process took place. Critical internal events happen within the forest sector, and critical external events happen in the national and international operating environment (bolded text in the results section). The visualized networks represent central actors and relationships between them, i.e., the structure of the network. The actors in the network are presented as roles performing similar kinds of activities and possessing similar kinds of resources (bolded text in the results section).

## 4 Results

In the results section the four constructed development phases are introduced each in turn first by identifying the critical changes in the operating environment and second by presenting the structure of the network, i.e., the key actors, resources, and activities.

### 4.1 First phase from the 1860s until the late 1910s: from the beginning of wood-based paper manufacturing in Finland to Finnish independence

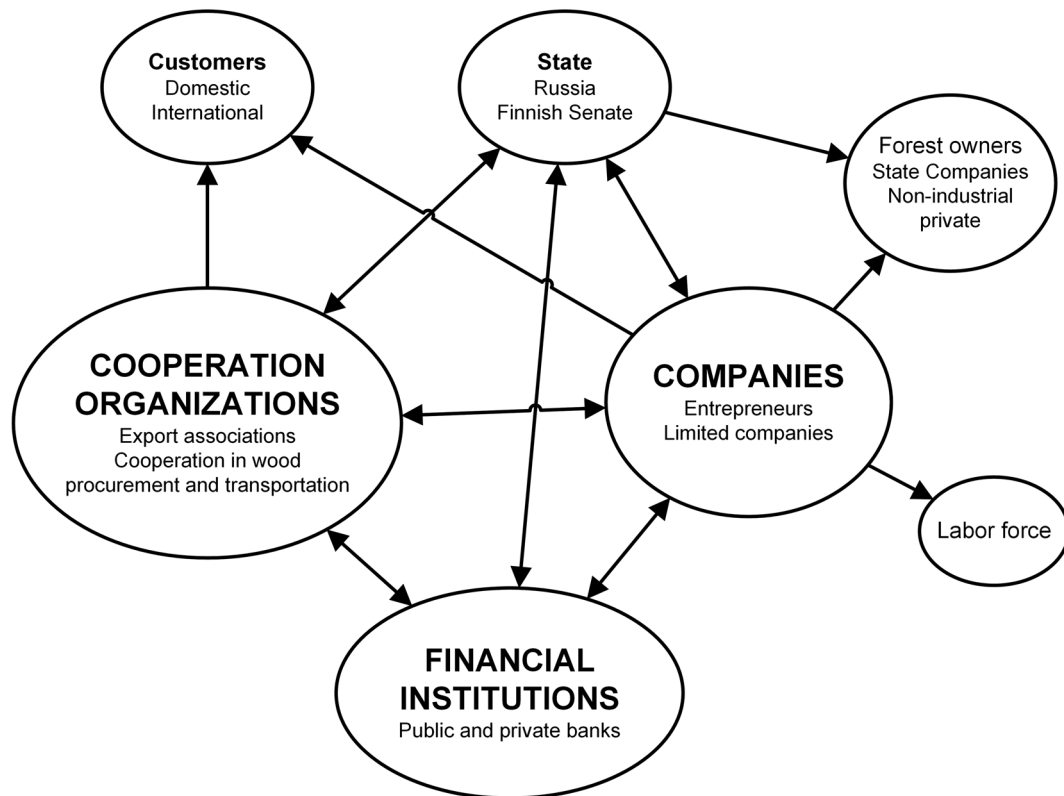
#### 4.1.1 Critical changes in the operating environment

The Finnish business system began to evolve during the 1850s, mainly due to political and economic regeneration in the Russian empire which resulted in **a more liberal trade policy** and legislation, as well as improved infrastructure developed by the Finnish Senate. These developments enabled entrepreneurs with innovative ideas and money to enter the conservative business system. **The consumption of paper increased** in the latter part of the 1800s, mainly due to newspapers and books becoming public products and enabling fast and widespread distribution of information. **The innovation of wood-based paper manufacturing** in the 1850s removed the last hindrance from the expansion of paper consumption and a new industrial sector of the pulp and paper industry emerged.

In Finland, the emergence of the pulp and paper industry happened in three phases. Firstly, in the 1850s, the manufacturing of paper from mechanical wood pulp was introduced. Then in the 1870–80s, the manufacturing of chemical wood pulp (cellulose) began. Finally, in the 1870–80s, the introduction of paper and cardboard machines integrated in the same mill site with mechanical or chemical pulp manufacturing finalized the creation of a new industrial business system: the business network of the Finnish pulp and paper industry.

#### 4.1.2 Key actors, resources, and activities

During the first phase, there were mainly two types of **companies** in the business network (Fig. 2). The first entrepreneurs who started to manufacture wood-based paper, came from outside the traditional forest sector. However, some of the traditional family-owned companies operating in



**Fig. 2.** The structure of the Finnish pulp and paper industry's business network from the 1860s until the late 1910s. The size and boldness of the font represents the power of that role: the bigger and bolder the font is, the more power the role has. Arrows represent relationships and interactions between roles. Double-headed lines are reciprocal and one-directional arrows indicate parallel interaction.

the sawmill industry, organized as limited companies, joined the pulp and paper industry. This only happened at the beginning of the 1900s, first by Norwegian companies and soon followed by Finnish companies, which resulted in the emergence of saw and paper mill integrates.

The role of **financial institutions**, mainly commercial banks, was important. Banks were both financiers and co-owners of many companies, and similarly, many company owners and decision-makers had important roles in financial institutions. Thus, these actors were strongly tied together. Different kinds of formal co-operational agreements were common in the Finnish forest sector, and the pulp and paper industry was no different. The already established **cooperation organizations** related to wood procurement, transportation, and export activities continued with varying success. Coopetition, simultaneous cooperation in some activities and competition in others, between companies protected the industry from harmful competition and fluctuating business cycles. Exports and **international customers** were extremely important from the very beginning because Finland is a small market with minimal demand. Products were exported to Russia and later to western Europe.

**The state**, mainly the Finnish Senate, started to pay more attention to the forest sector due to the increased use of wood, and as a large forest owner, it noticed that forests could provide income. Other significant **forest owners** were companies and non-industrial private forest owners, mainly farmers. The professional **labor force** in the pulp and paper mills was foreign, but in wood harvesting, logistics and non-professional work at the mills, employees were low-paid domestic workers, mainly men. Child and female labor was rare in the forest sector but very common in other industrial sectors.

The most central resources in the pulp and paper industry's business network were tangible and related to manufacturing: cheap wood, energy, and labor. Raw materials were cheap domestic wood, clean fresh water, and chemicals. The availability of wood and its price was a major concern and thus, owning forest land was strategically important in safeguarding a continuous wood supply. Technologies, machines, and the competence to operate them were foreign (e.g., German). Because pulp and paper manufacturing was capital intensive due to machinery-based manufacturing processes and many companies needed external financial capital. In addition, competence in foreign trade and social capital together with relationships were important intangible resources.

Similarly, the activities in the network were mainly related to actual business, such as manufacturing, logistics, wood procurement, marketing, and exporting. The strategy was to manufacture bulk products in integrated mills such as chemical and mechanical pulp, and newspaper, printing, packaging, and wrapping papers. Marketing and exporting were mainly done via export associations. Exports were concentrated on countries with no or low customs duties (e.g., Russia) or the exported goods were considered semifinished products or raw material and thus, no or very low customs duties were paid. This was the case when exporting pulp and newspaper to western Europe.

The network level activities were related to formal and informal interaction. Formal (negotiations and agreements) and informal (social influencing and lobbying) interactions happened via cooperation organizations and actors' personal networks. Activities related to forest management and environmental issues were important for the whole forest sector. National concern about deforestation, and thus the decreasing availability of wood, resulted in state-run forest governance and legislation with the objective of intensifying sustainable forest management to ensure wood supply and boost rational large-scale forestry. In addition, notions related to forest conservation were included in forest legislation and concepts such as 'protected forest' and 'retention trees' were added to forest management vocabulary.

## 4.2 Second phase from the 1920s until the late 1940s: from increasing competition to Second World War

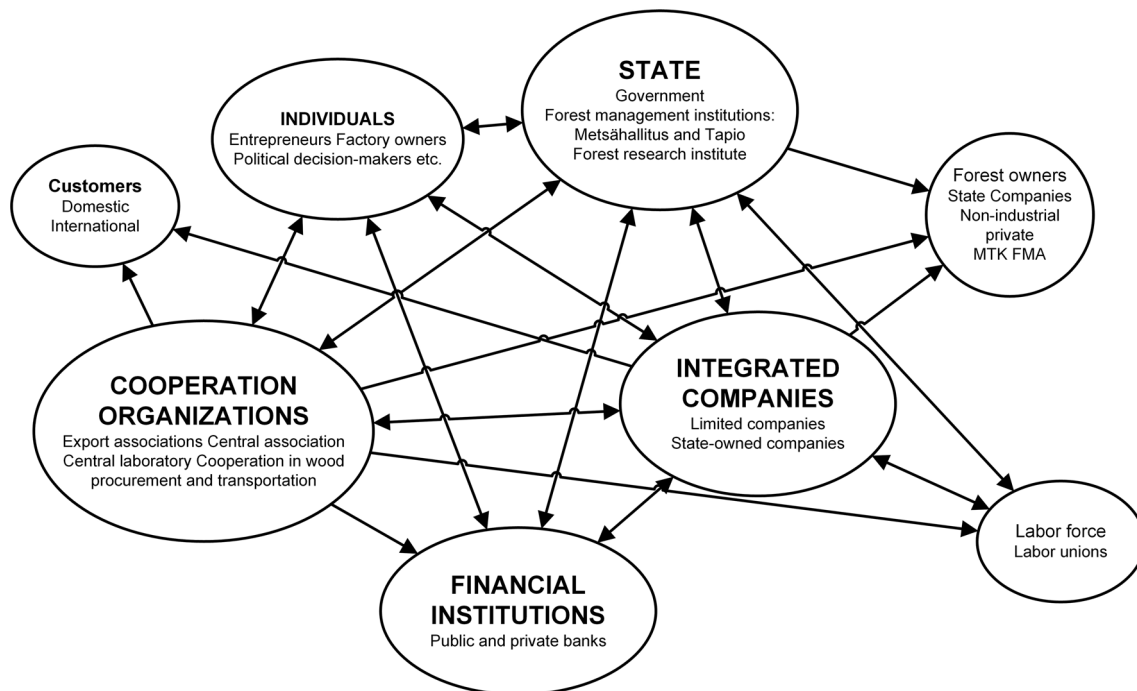
### 4.2.1 Critical changes in the operating environment

During the 1910s, there were **societal and political upheavals around Europe**. In Finland, the upheavals originated from the dichotomy between modern industrial capitalism and inherited power, coupled with strong connections to political and economic power and control over forest-based resources. The ensuing conflicts resulted in the First World War, the Russian revolution and **Finland's independence**. The new independent Finland introduced the idea of **economic nationalism** into its political and economic activities, meaning that safeguarding key industries' business activities to ensure the prosperity of the Finnish society.

By the end of the 1910s, **the division between the sawmill and pulp and paper industry had vanished** because many sawmill companies noticed the profitability of pulp and paper manufacturing. By the beginning of the 1920s, the Finnish national business system had formed: companies in the forest sector had taken their place as the driving force of Finnish economic and industrial development, Finnish societal and political power balances were established, and Finland had established its position as a land of forest sector in the international business system.

### 4.2.2 Key actors, resources, and activities

The aforementioned external and internal changes resulted in a transformation in the business network's deep structure (Fig. 3). Companies had evolved into **integrated saw, pulp, and paper**



**Fig. 3.** The structure of the Finnish pulp and paper industry's business network from the 1920s until the late 1940s. The size and boldness of the font represents the power of that role: the bigger and bolder the font is, the more power the role has. Arrows represent relationships and interactions between roles. Double-headed lines are reciprocal and one-directional arrows indicate parallel interaction.

**companies** which made company structures similar: they manufactured similar standardized products and used vast amounts of forest resources. The role of **the state** increased and became threefold. It was a business actor with state-owned companies, a large forest owner, and a political actor enacting laws and advising, supervising, and funding forest management through many organizations to guide people on how forests should be managed and utilized.

A new powerful actor of **individuals** emerged, such as entrepreneurs, company directors, political decision-makers, forest experts, and researchers. With their personal relationships and financial capital, these individuals had strong social, political, and economic power in the network.

Cooperation was a typical feature of activities, and actors cooperated throughout the whole production chain, from forests to the foreign markets, and thus, even more activities were outsourced to **cooperation organizations**. The power of export associations, as selling and exporting organizations, increased. A new powerful political and lobbying organization, Central association, was established. A research and development (R&D) organization, Central laboratory, was established to ensure the pulp and paper industry's R&D activities.

As the wood buyers (i.e., companies) cooperated, so did the wood sellers (i.e., **forest owners**). Local forest management associations (FMA) started to operate more widely among non-industrial private forest owners with the main role of assisting in timber trade. They received financial help from the state and advisory help from The Central Union of Agricultural Producers (MTK).

A strong hierarchical division in pulp and paper mills' **labor force** remained: employees with foreign backgrounds were managers and performed professional tasks, and Finnish employees performed non-professional tasks. After the societal upheavals, labor unions started to gain a foothold, but the proportion of organized employees remained rather low. One reason for this was that traditionally in the forest sector, there had been a strong personal relationship between employer and employee and thus, the integrated mill, as an employer, had a strong influence on employees'

personal lives and its region. In addition, increased state-led forest administration resulted in the emergence of domestic professional forestry workers to advise non-industrial private forest owners on forest management.

Related to resources, the question of accessing affordable raw materials and energy grew in importance, together with being resource efficient. The integration of the sawmill and the pulp and paper industry introduced sawing residue as a new raw material for pulp manufacturing and a new energy source for paper manufacturing. In addition, new technologies developed manufacturing processes such that different tree species, timber grades, and recycled fibers could be utilized as well as fibers being able to be recovered from the process. Such technological developments required financial capital.

Intangible resources started to gain more attention, which was not highlighted or manifested by the actors, rather it was an intrinsic and self-evident issue. The competence related to operating and designing machines and developing technology also received attention, and the younger generation started to be educated (e.g., as engineers). Still, most of the technologies and machines remained foreign. In addition, companies noticed that having long-lasting relationships with national and international political and business actors was important.

Manufacturing activities focused on manufacturing high quality bulk products. Most of the manufactured pulp was upgraded to different paper and paperboard products in the companies' own mills. The possibilities of manufacturing by-products from side streams and new pulp grades were noticed. For example, the innovation of dissolving pulp being upgraded to viscose and other synthetic fibers for the textile industry, and companies refined these synthetic fibers in their own mills. Due to the Second World War taking place in the latter part of second phase, the lack of oil and other raw materials resulted in the use of pulp and paper industry products as substitutes for energy, lubricants, and packaging materials.

The overall strategic view toward business was co-operational capitalism, where many activities were handled via cooperation associations. By cooperating, companies did not lose out financially in competition and with standardized products and production quotas, they were able to decrease marketing, exporting, and logistics costs. The establishment of a company-owned and financed Central laboratory guaranteed the industry's R&D with a focus on standardizing products and assuring the quality and suitability of different pulp and paper grades for western markets. In addition, close cooperation facilitated the industry's internationalization when companies first purchased their own mills abroad in the 1930s. In doing so, they established new positions and gained more power in the pulp and paper industry's international business network.

The role of formal and informal interactions and advocacy grew in importance. Corporativism and economic nationalism, the intertwined and integrated activities between state, industries, and their lobbying organizations, were important in the Finnish business system. Immersive amounts of forest related information, education, and advocacy communication were directed toward state and political decision-makers and disseminated through cooperation organizations, especially the Central association.

More attention was put on rational large-scale intensive forest management and state-led forest management gained a strong foothold. Companies started to manage their forests more intensively to ensure the supply of wood and thus, forests were cultivated by professional forestry workers. At the same time, environmental issues surrounding the forest sector gained more attention. The constant concern about deforestation and forest destruction was present in discussions and concerns about environmental pollution arose as increased manufacturing of chemical pulp polluted the air and water around the mills.



### 4.3 Third phase from the 1950s until the early 1990s: from the golden age of economic growth to economic crises, upturns, and European integration

#### 4.3.1 Critical changes in the operating environment

The Second World War and the subsequent period with **two competing business systems** of the west's free market and east's planned economy had a great impact globally. The global developments after the war resulted in **the establishment of many global collaborative organizations**, e.g., the International Monetary Fund (IMF) and World Bank and United Nations (UN), and trade agreements, e.g., General Agreement on Tariffs and Trade (GATT). These were followed by similar developments in Europe, e.g., the Organisation for European Economic Co-operation (OEEC), European Free Trade Association (EFTA) and European Economic Community (EEC).

The post-war economic boom and **rapid global economic growth**, with massive demands for forest sector products, resulted in increased cross-sectoral cooperation and the modernization of the Finnish pulp and paper industry. A key reason behind these developments was that Finland had to pay massive amount of war reparations to the Soviet Union, from which one third were forest sector products.

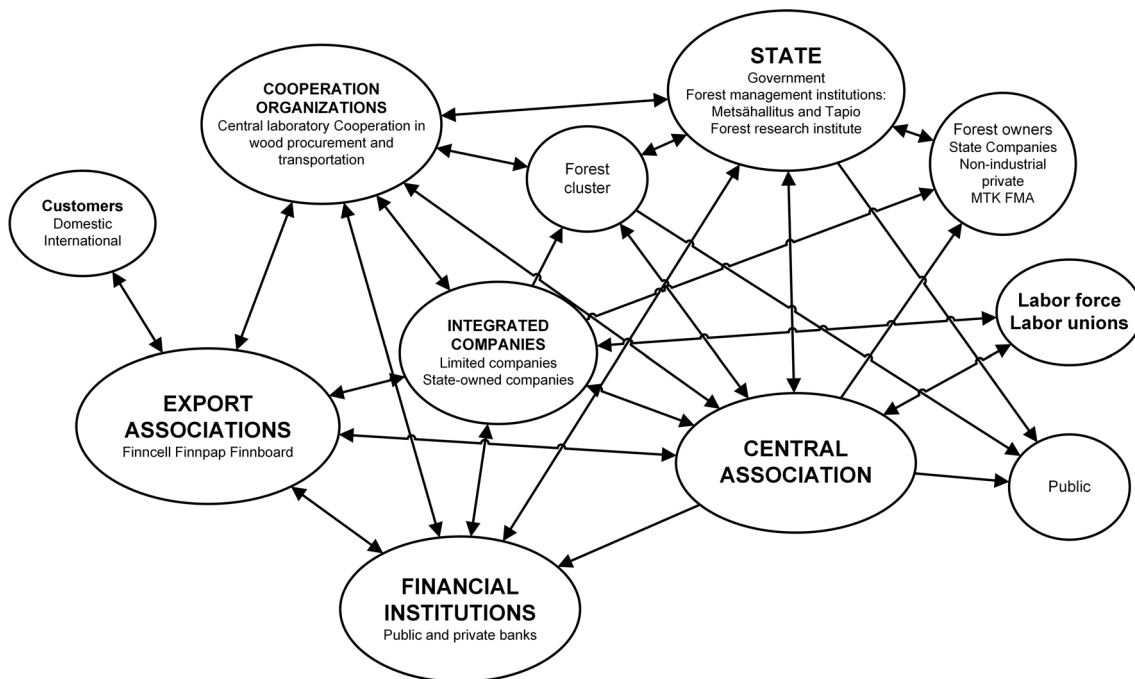
During the third phase, critical events influenced the pulp and paper industry's business network, causing minor adaptations within the network. For example, environmental concerns broke out internationally and in Finland in the 1960s, and oil crises in the 1970s affected oil prices and availability. Therefore, the pulp and paper industry adapted its activities: manufacturing was rationalized, the profitability of manufacturing gained more attention, and political lobbying was developed.

#### 4.3.2 Key actors, resources, and activities

During third phase, almost all domestic and international activities of the Finnish pulp and paper industry were organized through co-operational arrangements, and this complexity and dependence can be seen in the network's deep structure (Fig. 4). Two cooperation organizations had a strong role in the network, and thus emerged as separated roles: **Export associations** and a **Central association**. Finnish companies were known internationally as 'Enterprise Finland', where foreign companies competed against the Finnish export associations of Finncell, Finnpap and Finnboard, which diminished the role of individual companies. The Central association had a notable presence and power in politics and advocacy toward the state and public, especially related to public discussions and sharing financial and other information about the forest sector and its impacts on forests and the environment.

**The state** increased its power within the network through its three already established roles of a forest owner, a business actor by establishing more companies, and a political actor by regulating the operating environment, preparing forest policy, and providing guidance. In addition, the state's role as a financial actor through the Central Bank increased due to preparing financial policies and utilizing devaluations and revaluations of domestic currency.

A new actor, **the forest cluster**, emerged, which was not a conscious strategic move but rather a natural development following strong cooperation and the common needs of the entire Finnish business system. The roots of the forest cluster are in the latter part of 19th century, but a breakthrough happened in the 1950s due to war reparations. The cross-sectoral forest cluster consists of actors from forest, metal, chemical, electrical, automation, and packaging industries, as well as actors from research and education institutions and engineering offices. R&D in the cluster was present throughout the whole production chain and cooperation was beneficial to all actors in the cluster.



**Fig. 4.** The structure of the Finnish pulp and paper industry's business network from the 1950s until the early 1990s. The size and boldness of the font represents the power of that role: the bigger and bolder the font is, the more power the role has. Arrows represent relationships and interactions between roles. Double arrowed lines are reciprocal and one-directional arrows indicate parallel interaction.

During the third phase, individuals as a separate actor disappeared because they focused on their influence through different cooperation organizations. **The public** evolved as its own actor in the network. The forest sector felt that the public needed to be educated and advised on the sector's research-based forest management and utilization as well as the importance of the forest industry to the Finnish economy. Thus, the sector increased communication and influencing activities toward the public. However, this omniscient attitude was challenged by the public's increasing environmental awareness followed by criticism toward the sector in the 1960s.

Securing the supply of, and access to, key resources at affordable prices was essential for the pulp and paper industry. Modern machines with increased manufacturing capacity required more raw materials. The rapid modernization of manufacturing, harvesting, and logistics resulted in investments in the best possible technology and machines regardless of their origin. The labor force became domesticized when professional employees started to be Finnish. Farmers continued being a cheap labor reserve in forestry work. These issues resulted in increased labor, wood, logistics and harvesting expenses.

Intangible resources became more important in ensuring the competitiveness of the industry. Even though individuals as separate actors vanished from the network, their powerful intertwined roles as decision-makers, influencers and owners within companies, banks and other organizations remained. Their domestic and international relationships and social networks were especially important. The emerging competence system within the forest cluster became one of the supportive powers ensuring the sector's competitive advantage. The co-competition in the forest cluster enabled the creation and development of the competence system in companies' own training activities and public research and education. For example, during the 1970s, the growing number of domestic engineers within the forest cluster developed manufacturing processes and machinery, which resulted in the domestication of the forest cluster's technology base. In addition, engineers and other workers in mills had a high-level of industrial competence to operate modern cutting-edge machinery.

The activities in the pulp and paper industry's business network were mainly business activities, but non-business-related activities grew in importance due to increased interaction with the public. The manufacturing strategy was cost-efficient, large-scale, intensive production of standardized quality bulk products in integrated mills, where continuous manufacturing was a key success factor. The main products remained the same with minor adaptations; a new tissue paper product was introduced together with an increased use of by-products as end-products or energy. Because there was no longer a shortage of oil, the use of substitute products diminished. Generally, strategic activities focused on long-term planning, being self-sufficient in the whole production chain, and protecting the international market position by investing in manufacturing facilities abroad. The modernization of activities reached forests via the mechanization of harvesting, forestry work and logistics, and the intensification of forest management via professional forestry workers and extensive dissemination of research-based information. Intensive forest management activities aimed to improve wood production by using cultivation, soil preparation, and fertilization.

Formal and informal co-operational business and non-business interactions via different organizations and personal relationships were important. Central actors in the business network had formal negotiations and agreements on prices, production quotas, investments, and wood procurement territories, both nationally and internationally. R&D activities concerning technologies, manufacturing processes, and new and improved products increased. Vast amounts of R&D were done within the forest cluster and in the world-famous Central laboratory. A key reason for increased R&D was paying off war reparations but still, the amount of capital invested was rather low and aimed to maintain the position of a quality bulk producer. In addition, so-called industrial diplomacy was practiced in Europe. This meant that industrial delegations, consisting of pulp and paper manufacturers from different countries, formally negotiated and mutually decided on price levels, manufacturing amounts, and market shares.

Intensified forest management was heavily criticized by the public and environmental organizations and thus, resulted in increased attention toward industry's environmental issues, e.g., emissions from the mills. As the whole forest sector had quite a poor image among the public it initiated a massive information campaign targeted to whole Finnish society with an aim to demonstrate its importance to the Finnish economy and to promote its activities and employment opportunities. The campaign was successful and by the 1970s the forest sector had polished its image and secured its position in labor markets through developing research, education, and professional skills of domestic employees within the whole production chain.

#### **4.4 Fourth phase from the 1990s until the early 2010s: from structural changes to crisis of paper and dawn of bioeconomy**

##### *4.4.1 Critical changes in the operating environment*

During the 1980s, the Finnish business system started to shift toward **a free-market economy and global financial capitalism with decontrolled capital markets**. The collapse of the Soviet Union, the recession, increased integration with Europe with free-trade agreements and **European Union (EU) membership** caused structural changes in the Finnish business system. In addition, the renewed competition legislation made the forest sector's formal agreements on prices and manufacturing quotas illegal.

Incremental internal changes in company activities began at the end of the 1970s and accelerated in the late 1980s, which resulted in **structural changes in companies**. Strategic focus shifted from diversification to focusing on core businesses. In addition, there were massive consolidations

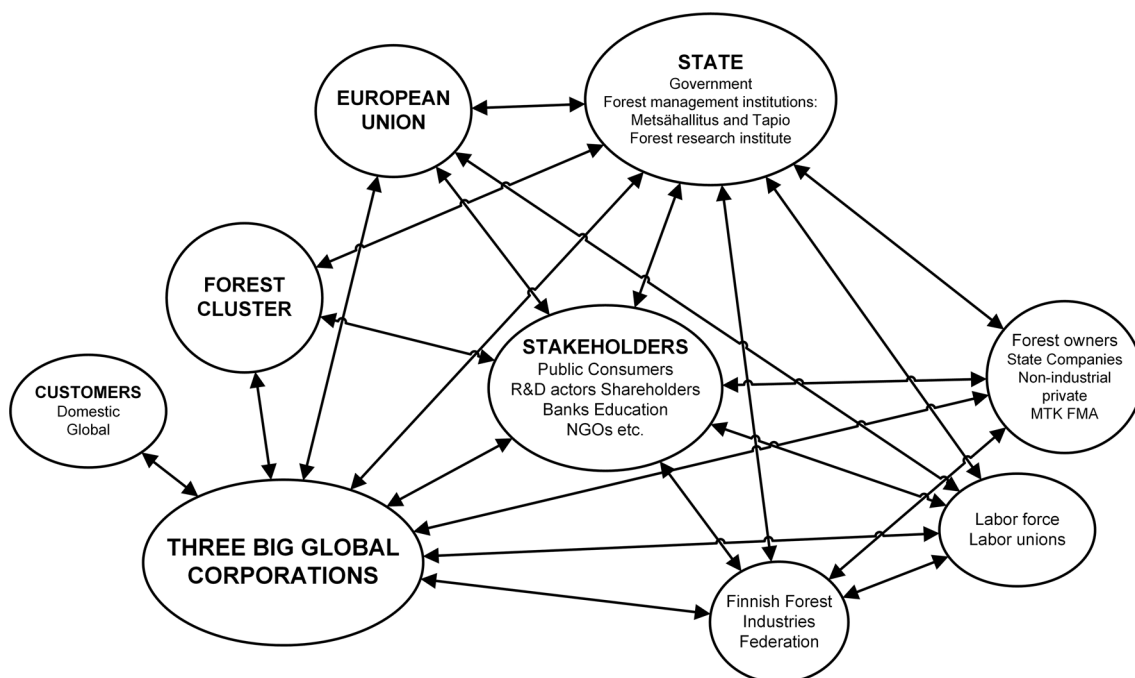
in the pulp and paper industry through mergers and acquisitions with the aim of securing growth and profitability in domestic and international markets.

In addition, **the public image of the forest sector** shifted from being the essential flagship of Finnish export industries. The share of the forest sector's exports in Finland decreased from 80% in the 1950s to 50% in the 1970s and even further to only 34% in 1995. Especially among the younger generation, the whole forest sector was seen as old-fashioned and having many environmental problems while other industrial sectors, such as electronics and information technology, felt trendier. The change in public image, together with **raising environmental awareness among consumers**, affected international customer relationships.

These harsh changes in the operating environment meant that the era of national forest capitalism was over, and the pulp and paper industry encountered a radical change in its business logic as companies now had to survive independently after more than 100 years of strong formal cooperation. Nevertheless, the Finnish pulp and paper industry was able to rise from the recession and make structural changes to become one of the most modern and productive industries in the world.

#### 4.4.2 Key actors, resources, and activities

Massive structural changes occurred in the pulp and paper industry's business network (Fig. 5) when the integrated companies consolidated into **three big global corporations**. Thus, the previously powerful actors of financial institutions and cooperation organizations disappeared, or their roles diminished, and the corporations took over their activities. Due to the collapse of trade with the Soviet Union, **customers** changed, and most exports were directed to western Europe and globalization brought new customers from Asia and South America. In addition, the role of the



**Fig. 5.** The structure of the Finnish pulp and paper industry's business network from the 1990s until the early 2010s. The size and boldness of the font represents the power of that role: the bigger and bolder the font is, the more power the role has. Arrows represent relationships and interactions between roles. Double-headed lines are reciprocal and one-directional arrows indicate parallel interaction.

Central Association diminished and changed. At the beginning of the 1990s, it changed its name to **the Finnish Forest Industries Federation** and transformed into a lobbyist and employers' association. It has a strong role in advocating and reporting forest industry related issues to the state and the EU.

The change to a free-market economy diminished **the state's** role in business related activities, however the state-led organizations' roles in advising and preparing forest policy and legislation remained important. A new actor, **the European Union**, emerged and developed an interest in forest-related issues when the big forest countries of Finland, Sweden, and Austria became members in 1995. Although the EU does not have common forest policy per se, there are regulations and directives that affect the pulp and paper industry directly and indirectly.

In general, the role and structure of different co-operational organizations changed when formal activities became illegal. This did not stop state- and other association-led co-operations, only the form and structure of activities were altered, and actors were called **stakeholders**. Stakeholders include different public and private interest groups, from the public to consumers, banks, and shareholders to non-governmental organizations (NGO) and lobbying organizations. Especially in forest policy preparation, the role of stakeholders grew when the process became open since all stakeholders are included in preparation activities. The focus of forest policy shifted when economic, ecological, and social sustainability through the concept of sustainable development entered public and political discussion.

Moreover, the pulp and paper industry had lost its cheap key resources. Domestic wood was rather expensive but cheap globally. Utilizing other tree species, e.g., eucalyptus, in domestic and global manufacturing partly covered this loss. Labor was expensive but competent and companies felt that this advantage should be maintained because it cannot be lost as easily as cheap, tangible resources. Only energy had remained rather cheap because chemical pulp manufacturing was energy self-sufficient, and companies had their own energy facilities. On the other hand, with the help of the forest cluster and its competence system and co-operational interactions, the Finnish pulp and paper industry had become an international leader in technology, with 90% of all machines being domestic. The forest cluster's engineering companies were international leaders in manufacturing machines for pulp and paper mills and wood harvesting.

The increasing environmental awareness of global consumers and customers together with sustainable development strongly affected the activities of the pulp and paper industry. Corporations have started to take environmental issues seriously and see them as an essential part of business strategy and competitive advantage. Stakeholder interaction had to be considered in all activities from manufacturing to marketing and selling and communication. Therefore, the importance of informal advocacy increased, and lobbying was done in cooperation with e.g., actors in the forest cluster.

Corporations had global manufacturing with lower raw material and manufacturing costs, and their strategy followed the idea of more-of-the-same where products remained rather similar, but production increased. Although the strategic talk of the pulp and paper industry has been to increase the level of upgrading, the actual business activities have played it safe, and the manufactured products have certain large-scale markets and demand. However, within the forest cluster, the importance of marketing and studying customer needs and including services and modern technology in innovations within the network has been acknowledged even though these are outside the cluster's core business.



## 5 Discussion

The objective of the study was to construct a systemic picture of the historical development of the Finnish pulp and paper industry's business network. The first research question, how the Finnish pulp and paper industry's business network has developed, is answered through the ARA framework (Håkansson and Snehota 1995). The network can be said to have evolved from a rather simple one, with only a few actors, to a complex one with many actors, before returning to relative simplicity. This simplicity is only apparent because there are many individual actors, but the roles they play in the network are quite similar. For example, there are many actors that fit under the role of stakeholders, like shareholders, consumers, and NGOs, but from the pulp and paper industry's perspective, the industry needs to take them into account when performing especially intangible influencing and communication activities. These actors are not necessarily related to tangible activities like manufacturing, but despite not necessarily being directly business-related, they still may possess the right capabilities and have an important role in influencing the industry's activities (Medlin and Törnroos 2014). By acknowledging the diverse role of stakeholders in business activities, the pulp and paper industry could develop its social capabilities by utilizing stakeholder relationships in value cocreation (Tate and Bals 2018), and thus obtain a more socially sustainable competitive advantage. In addition, it should be noted that the constructed network presents only the Finnish actors along with their foreign customers, thus, the global business network of the pulp and paper industry is far more complex. Interactions between actors have always been co-operational and cooperative and they have evolved from formal contract-based cooperation to informal advocacy and cooperation between global companies. Cooperation in all activities within the network has enabled the whole Finnish forest sector to evolve as a cross-sectoral forest cluster. This finding is in line with the positive outcomes of cooperation related to innovation, knowledge sharing, firm performance, and relationships (Bengtsson and Raza-Ullah 2016). On the other hand, it contradicts Guerrero and Hansen's (2018) review in which they view cross-sector collaboration as difficult in the forest sector.

The pulp and paper industry has always been concerned about securing its key resources of raw material, labor force and energy, only the focus has varied. Ensuring a sufficient supply of wood has been of particular concern, which has led to a sustainable forest management with a focus on maximizing wood yield. Due to the increasing environmental awareness of stakeholders, the focus has evolved to also include ecological sustainability, which has been a highly important development for the industry. The sustainability of the industry's forest utilization is under debate even today due to the emerging bioeconomy with conflicting stakeholder interests, especially related to the biodiversity, ecosystem services and other ecological issues (Kröger and Raitio 2017; Eyvindson et al. 2018). It has been estimated that the transition to forest-based circular bioeconomy will lead to increased consumption of wood-based biomass, from which large parts might be used for lower value-added products (Hietala and Huovari 2017). However, the increased consumption of especially virgin biomass might cause problems in meeting the aims of sustainable development (Folke et al. 2016; Karvonen et al. 2017; Fritsche and Rösch 2020). Nevertheless, it is expected that the future product portfolios of forest-based sector companies will be more versatile, with new and possibly more value-added products (Näyhä 2021), which should help companies to gain a sustainable competitive advantage. Even though labor has become expensive, it is competent, which has enabled the industry to be innovative and become internationally competitive. In addition, a partial change in key resources has occurred where tangible resources of raw materials have been substituted with intangible resources of competence and relationships. The interactions and resource integration in the network (Håkansson and Snehota 1995) have enabled the creation of the forest cluster's competence system, where the role of knowledge and expertise (Mouzas and

Ford 2012) and actor's social capabilities (Tate and Bals 2018) are vital for creating a sustainable competitive advantage. The role of intangible and human-related organizational resources has been acknowledged as being an important factor for the forest-based sector's transition to circular bioeconomy (Näyhä 2020).

Activities related to R&D and technological innovations are playing an important role in the network. In the beginning, different radical technological developments and innovations related to manufacturing and machinery were crucial, but after the industry had established its position, only incremental industrial innovations related to, for example, manufacturing processes and product quality have occurred. This finding is in line with the notion of Möller et al. (2020) on mature business fields where innovations and developments tend to be incremental and maintain the industry's established ways of operating, i.e., following dominant business logic (Prahalad and Bettis 1986). This has led to favoring a business-as-usual strategy where activities focus on maintaining the current position with the best possible economic result, which has resulted in, and is caused by, path dependency and lock-in mechanisms (Näsi et al. 2001; Luhas et al. 2019). This strategy has been overruled only by a radical change in the operating environment and, out of necessity, the industry is starting to change its activities. For example, increasing the level of upgrading has been a part of industry's strategic vision since the 1950s, with a focus on fulfilling the needs of industrial customers, not that much the consumers. However, the current manufacturing trends have rather resulted in a backwards step in production to manufacturing market pulp, because this strategy seems profitable due to increasing demand for pulp and its by-products (Hurmekoski et al. 2018). In addition, addressing sustainability issues in activities and business practices can create tensions within the network and between actors, especially when the network is complex and actors have differing values and goals (Tura et al. 2019). Therefore, social (Bondeli et al. 2018) and environmental (DeBoer et al. 2020) perspectives should be integrated in everyday activities and the planning of future strategies.

The answer to the second research question, what internal and external events have triggered the network to change, is that especially external events and actors have always had major impacts on the Finnish pulp and paper industry's business network and its development. Major global political, economic, and social events, such as wars, economic downturns and upturns, and societal upheavals, have affected the network and resulted in reconfigurations (Halinen et al. 1999). National events have also had impacts on the network's development, like the establishment of forest management institutions, such as state forest organization Metsähallitus and forestry development and consulting organization Tapio, and the creation of the Best Practice Guidelines for Sustainable Forest Management. Additionally, structural changes related to the number of companies operating in the industry, from few to many and back to a few due to consolidation, have had an impact on the network. These findings highlight the role of institutions as both enablers and conditioners for network development (North 1990; Matthyssens et al. 2013) while simultaneously acknowledging the influencing forces that make, break, or maintain the institutionalized ways of operating originating from macro, meso and micro levels (Koskela-Huotari et al. 2016). It can be said that the Finnish pulp and paper industry's business field network follows the idea of a business network as an emergent structure (Håkansson and Snehota 1995); network development is rather reactive, and adaptations occur after critical events. At first, the field's business network was quite agile and adapted easily as the new business field was emerging. Over the time, when the business field matured, adaptations became less agile due to e.g., institutionalization and underlying technologies (Möller et al. 2020).

World politics and commercial policies will continue to have major effects on the global pulp and paper industry's network. For example, the growing importance of the consumer's perspective and sustainable consumption preferences (Milfont and Markowitz 2016), together with servitization of manufacturing industries (Pelli et al. 2018) and digitalization, affect the global business

environment. The pace of changes occurring has accelerated; the first phase lasted just over 50 years, but the fourth phase for less than 20 years. Since the end of the study period of the present research in early 2010s, several visible signs and weak signals have emerged pointing to Finnish pulp and paper industry's business network undergoing changes due to critical global drivers such as climate change, biodiversity loss, recognition of planetary boundaries, and the transition to circular bioeconomy (Pätäri et al. 2016; Kröger and Raitio 2017; Toppinen et al. 2017; Toivanen 2021). National events are also having an influence, such as paper mills closing, organizational changes in private forestry (Valonen et al. 2019), renewed forest legislation (Harrinkari et al. 2016), and the introduction of the biorefinery concept and new bio-based products and solutions (Hämäläinen et al. 2011; Pätäri et al. 2011; Näyhä and Pesonen 2014; Temmes and Peck 2020).

The scientific and theoretical novelties of this study are discussed and reflected on through analyzing the feasibility of the conceptual framework in studying forest-based companies and their networks. Viewing operating environments as complex and nested with interrelated layers (Möller et al. 2020), and thus adopting the concepts of dynamic business network theory and ARA framework (Håkansson and Snehota 1995) in the scientific vocabulary of forest economics research, offers a systemic and holistic view of the world. Incorporating phenomenon-based (Schwarz and Stensaker 2016) and historical (Fullerton 1987) approaches to studying the development of an industry's business network and how industry specific institutions, structures, and technologies affect business activities aids in understanding how forest-based companies can create innovative business models (Bocken et al. 2014; Evans et al. 2017; Möller et al. 2020) that enable a truly sustainable competitive advantage. Even though the ARA framework is old, it succeeds in capturing the most important concepts related to analyzing real-life business cases: actors perform resource integrating activities through reciprocal interactions in dynamic networks. The conceptual framework makes it possible to construct a mid-range theory (Brodie 2017) and create new scientific knowledge in forest economics by acknowledging the role of tangible and intangible resources (Vargo et al. 2008; Löbner 2013), relationships and interactions in resource integration (Håkansson and Snehota 1995) and the importance of various economic, environmental, and social actors (Bondeli et al. 2018) in sustainable value co-creation in forest-based businesses.

From a managerial perspective, the contribution of this study is that the conceptual framework offers a rather straightforward tool for managers to apply in formulating strategies, and even everyday activities, in a forest-based company. The framework considers key concepts related to business activities, the operating environment, and how change affects business networks. Understanding who the key actors are, and the key resources and key activities, can help forest-based companies to find their sustainable competitive advantage. Companies and their managers should try to understand and manage networks, and thus be proactive toward change (Medlin and Törnroos 2014). Being open to change signals and possibilities in the operating environment can help companies to alter their business activities in advance. For example, as Hetemäki and Hurmekoski (2016) state in their article, the forest sector has relied on modelling the future markets, which might lead to important signals being ignored, such as structural changes, diffusion of new products and services, and global sustainability challenges. These external pressures, together with a company's internal pressures such as competition between different business functions, can be change signals that result in adaptations within companies (Laurila and Lilja 2002), and thus, managers should be able to notice them. Using insights from open foresight and open innovation could lead to being better prepared for the future and being the "future-fittest" (Hansen et al. 2020). Therefore, the sustainability transition creates many challenges and opportunities for the pulp and paper industry and its business network's development when planning bioeconomy-related future-oriented strategies aimed at creating sustainable competitive advantage. One crucial issue to be solved is how sustainability, competitiveness, innovations, organizational culture, and institutions are seen

in these strategies (DeBoer et al. 2020; Näyhä 2020). Similarly, it is important to understand the external environment and what kind of sustainability and responsibility markets and society are expecting from the industry (Ranacher et al. 2017; Näyhä 2020).

The scientific quality of the study is assessed by discussing the applied methods and materials. As the aim was to construct a systemic picture and gain an in-depth understanding of the case, the applied case study methodology with qualitative theory-oriented content analysis method worked well. This study is not a systematic literature review synthesizing existing scientific knowledge, but instead, a meta-analysis and synthesis of historical data which is rich in content but small in terms of available scientific texts, especially in English. Using qualitative methods always brings about challenges related to reliability and the validity of interpretations derived from data. In this study, data triangulation as well as discussing and cross-checking the interpretations between the present authors helped to meet these challenges.

## 6 Conclusions

The global forest sector and its activities have been, and still are, strongly resource-based and -intensive, due to which, Finland and other countries in the boreal forest belt have had a natural competitive advantage with vast amounts of wood resources. After the Second World War, many regions of the world underwent massive reconstruction and the forest sector, with its large-scale consumption products such as newspaper, hygiene paper, packaging materials, and construction materials, was able to fulfill the growth needs of the world's societies, and thus increase prosperity. Therefore, the business logic of cost-efficient, large-scale, and intensive manufacturing of standardized bulk products was necessary to ensure the business success of Finland as a small and open economy within the global business system. However, after entering the 21st century with its open, globalized, and digitalized world, and acknowledging the sustainability challenges and the developments in western societies into service and knowledge societies, there seems to be a need for a paradigm shift; to abandon the over consumptive and destructive business logic and enter the sustainable circular bioeconomy (Fritsche and Rösch 2020; Bocken and Short 2021). Thus, the whole forest sector should consider a shift in focus from being merely a producer, producing low value and high quantity, to being a producer with knowledge and service orientation, offering higher value and lower quantity (Toppinen et al. 2017; Hurmekoski et al. 2018; Material Economics 2021). Similarly, the sector should consider taking a more versatile view on forests and see them as a whole ecosystem, offering services and benefits for the whole humankind and providing many business opportunities (ten Brink et al. 2012; EC 2015).

The research design of this study, a novel approach in forest economics, offers new insights for analyzing forest-based business networks and their development. Considering the development of an industry's business network as an intrinsically interesting phenomenon (Stake 1995; Schwarz and Stensaker 2016) with historical roots (Fullerton 1987) enables the creation of new knowledge and understanding on a researched topic. Similarly, as the phenomenon is investigated and explained through a conceptual framework, new mid-range theory (Brodie 2017) can be constructed, which can help forest-based companies to find a sustainable competitive advantage. Forest-based companies need to recognize the importance of stakeholders as economic, environmental, and social actors in the network (Bondeli et al. 2018; Tate and Bals 2018). Companies need to discover the right combination of tangible and intangible resources, and to notice the social capabilities and special features of natural resources as ways to enable sustainable value co-creation (Barney 1991; Håkansson and Snehota 1995; Vargo et al. 2008; Löbner 2013; Tate and Bals 2018). The role of relationships and interactions in cross-sectoral collaboration and R&D activities (Håkansson and

Snehota 1995; Koskela-Huotari et al. 2016; Möller et al. 2020; Keränen et al. 2021) needs to be emphasized. Similarly, forest-based companies ought to acknowledge that external and internal critical events will have an impact on the operating environment, requiring adaptations in the business network (Håkansson and Snehota 1995; Halinen et al. 1999).

Based on the findings and discussions of historical pathways and developments within the pulp and paper industry acknowledged in this study, as well as the changes and challenges in the global operating environment, some thoughts about the possible future developments for the forest-based sector can be put forward. First, is there a time for a new, emerging bio- and forest-based business field with innovative outsider entrepreneurs, like at the beginning of the first phase? Second, will there be a reconfiguration in the existing forest sector with new products substituting for old raw materials and products, like at the end of the second phase when, due to a lack of fossil-based raw materials, wood-based raw materials and products were developed? Third, will more collaboration with other industries (e.g., textile, chemistry, pharmaceuticals) or creating business ecosystems with companies of different sizes happen, like during the third phase when forest cluster was introduced? Fourth, will the consolidated companies focusing on core business transform into conglomerates, like during the third phase, or will they separate into smaller companies, like they were during the first phase? Fifth, will the power of individuals as influencers gain more of a foothold in the business network and its activities, like during the second phase when entrepreneurs and company owners took part in social discussion and decision making? Or, finally, will there be something completely new with sustainable and innovative networked competence-based business models applying the circular economy principle of ‘more with less’ and where forests are more than just a tangible resource base? The findings of this study imply that the Finnish pulp and paper industry and its business network has been able to transform and adapt to changes in its external and internal operating environment before. Recent studies also show that the industry and its companies aim to answer the needs of sustainable circular bioeconomy (Toppinen et al. 2017; Luhas et al. 2019; Näyhä 2019; D’Amato et al. 2020; Näyhä 2020), and thus, the sustainability transition should not bring about any insurmountable obstacles for forest-based companies looking to find a truly sustainable competitive advantage.

Along with these conclusions, one idea for further study is to construct the fifth phase of the Finnish pulp and paper industry’s business network: is it evolving and in which direction? Similarly, constructing the development phases within the Finnish sawmill industry’s business network would be interesting in order to find out whether it differs significantly from the pulp and paper industry’s network. In addition, further studies could be related to constructing similar pictures, either on the development or the current situation, for countries where the forest sector has a historically strong role, such as Sweden, Norway, Canada, USA, and Russia, or in areas where it is currently important, like Latin America and Asia.

## Supplementary files

S1.pdf; Collected dataset of and detailed references for documents discussing the history of Finnish forest sector, available at <https://doi.org/10.14214/sf.10599>.

## Declaration on the openness of research data

The used secondary research data are publicly available in many Finnish libraries, and the data sources have been cited accordingly. Researcher’s written notes are available upon request.



## Authors' contributions

**Anu Laakkonen:** The conception of research question and design of the work; Acquisition, analysis, and interpretation of data and results; Scientific writing of the work; Revising writing critically for sound and intellectual content; Final approval of the version to be published.

**Teppo Hujala:** The conception of research question and design of the work; Revising writing critically for sound and intellectual content; Final approval of the version to be published.

**Jouni Pykäläinen:** The conception of research question and design of the work; Revising writing critically for sound and intellectual content; Final approval of the version to be published.

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