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Opportunities in co-operation with China

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## Summary

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The region of North Karelia, Finland, has a strong forest-based bioeconomy sector. This report describes the region's opportunities for increasing co-operation in forest-based bioeconomy with China. The forest-based bioeconomy sectors covered in this report include wood products, non-wood forest products (NWFPs), and nature-based tourism (NBT). Moreover, this report presents two future scenarios for bioeconomy development in North Karelia.

The results indicate that there are untapped potentials in North Karelian forest-based bioeconomy to grow with increasing co-operation with China. New value-adding products and services may be identified to meet the needs of Chinese consumers and business collaborators. For wood-based products, the new possibilities mostly relate to re-organizing the export product structure from primary products towards further processed ones, as well as incorporating services with the export products. For NWFPs, export potentials were identified in North Karelian chaga and reishi mushroom products and further processed goods. In terms of NBT sector, North Karelia can offer unique, sustainable, and high-quality NBT experiences for Chinese niche markets. This includes professional and educational tourism.

North Karelian companies should re-organise and tighten their internal networks and enhance co-operation by integrating different sectors to meet the demand, to develop new products and services, and to carry out joint marketing in China. Finnish sauna, an esteemed Finnish brand with a rapidly increasing market demand in China, was identified as a concept worth further developing in North Karelia. Our desired scenario suggests that growing businesses would bring hundreds of new jobs and hundreds of millions of euros turnover in North Karelia annually. However, several barriers need to be overcome. Current products with low production volumes are suitable to niche markets, but identifying these markets, creating and fostering the mandatory contacts, and establishing viable business requires long-term and systematic work.

North Karelia has huge capacity in forest-based circular bioeconomy. Systematic branding can transform North Karelia into an international knowledge hub for businesses and academia related to different forest bioeconomy sectors. This will not only have beneficial impacts on the regional economy in North Karelia but also far-reaching impacts on the global sustainability of the bioeconomy sector. North Karelian forest-based bioeconomy expertise can still increase its global footprint in improving the sustainable use of natural resources.

**Keywords:** Bioeconomy, forest-based bioeconomy, wood products, non-wood forest products, forest products, nature-based tourism, North Karelia, China

## Tiivistelmä

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Pohjois-Karjalan maakunnassa on vahva metsäbiotaloussektori. Tässä raportissa kuvataan alueen mahdollisuuksia lisätä yhteistyötä Kiinan kanssa kolmella metsäbiotalouden osa-alueella: puutuotesektorilla, metsien ei-puuaineisten tuotteiden eli luonnontuotteiden sektorilla sekä luontomatkailussa. Lisäksi raportissa esitetään kaksi tulevaisuuskenaariota Pohjois-Karjalan metsäbiotalouden kehittymiselle.

Tulokset osoittavat, että Pohjois-Karjalan metsäbiotaloussektori voi kasvaa Kiina-yhteistyön avulla. Kiinalaisten kuluttajien ja yhteistyöyritysten tarpeisiin tulisi vastata erityisesti raaka-aineita ja perustajalosteita korkeamman lisäarvon tuotteilla ja palveluilla. Puutuotesektorin uudet mahdollisuudet liittyvät ensisijaisesti pidemmälle prosessoitujen tuotteiden kasvavaan vientiin sekä asiakastarpeita vastaaviksi muotoiltuja palveluja ja tuotteita yhdistävän tarjooman luomiseen. Luonnontuotteista pakurilla ja lakkakäävällä sekä niitä sisältävillä pidemmälle jalostetuilla tuotteilla tunnistettiin vientipotentiaalia. Luontomatkailualueena Pohjois-Karjala voi tarjota ainutlaatuisia, kestäviä ja huippulaatuisia elämyksiä Kiinan niche-markkinoille. Myös ammattilais- ja koulutusmatkailussa on potentiaalia.

Monet nykyiset pienen tuotantovolyymien tuotteet sopivat Kiinan niche-markkinoille, mutta markkinoiden löytäminen, kontaktien luominen ja ylläpito sekä elinvoimaisen liiketoiminnan saavuttaminen edellyttää pitkäjänteistä työtä, mikä on usein ylivoimainen ongelma yksittäisille pk-yrityksille. Pohjoiskarjalaisten yritysten tulisi organisoitua, tiivistää verkostojaan ja lisätä biotaloussektoreiden välistä yhteistyötä vastatakseen Kiinan kysyntään, kehittääkseen tuote- ja palvelutarjontaansa sekä tehostaakseen yhteismarkkinointia. Sauna on arvostettu suomalainen brändi, jolla on voimakkaasti kasvava markkina Kiinassa, ja jonka ympärille olisi mahdollista rakentaa kokonainen vientiin tähtäävä osaamisklusteri. Positiivisessa skenaariossa Pohjois-Karjalan metsäbiotaloussektorin kasvu luo alueelle satoja uusia työpaikkoja ja satoja miljoonia euroja vuotuista liikevaihtoa. Tämä edellyttää lukuisien esteiden poistamista.

Pohjois-Karjalan kapasiteetti metsäbiotaloudessa on valtava. Systemaattinen brändityö voi muuttaa alueen kansainvälisesti merkittäväksi metsäbiotalouteen liittyvän yritystoiminnan ja osaamisen keskuksiksi. Tällä on positiivisia vaikutuksia alueen talouteen ja elinvoimaan, mutta myös kauaskantoisempia vaikutuksia globaalissa kestävässä kehityksessä. Pohjois-Karjalan metsäbiotalousosaaminen voi edelleen kasvattaa rooliaan luonnonvarojen kestävä käytön globaalissa viitekehityksessä.

**Avainsanat:** Biotalous, metsäbiotalous, puutuotteet, luonnontuotteet, luontomatkailu, Pohjois-Karjala, Kiina

## 概括

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芬兰北卡累利阿 (North Karelia) 地区拥有发达的林业生物经济部门。本报告论述了该地区与中国加强林业生物经济领域合作的机会。本报告中森林为基础的林业生物经济部门涵盖木材产品、非木质林产品 (NWFPs) 和基于自然的旅游业 (NBT)。此外, 本报告也分析了未来北卡累利阿地区林业生物经济发展的两种情景。

研究表明, 伴随与中国合作增加, 北卡累利阿地区以森林为基础的林业生物经济发展潜力不断提升。北卡累利阿地区将推动林业生物经济高附加值新产品和服务发展, 以满足中国消费者和企业合作伙伴的需求。对木材产品而言, 新方向主要指初级产品为主的出口产品结构转型、重组为以高附加值加工制成品为主, 并将服务与出口产品相结合。对非木质林产品而言, 北卡累利阿的白桦茸、灵芝及其加工制成品对中国市场具有出口潜力。在基于自然的旅游业领域, 北卡累利阿地区可以为中国客户提供独特、可持续、高质量的基于自然的旅游体验, 也包括专业和教育旅游。

北卡累利阿地区企业应当重组和强化内部合作网络, 整合不同部门促进合作, 满足市场需求, 开发新产品和服务, 并在中国进行联合营销。芬兰桑拿设备作为被广泛认可的芬兰品牌, 中国市场对其需求增长迅速, 桑拿设备贸易将进一步发展。我们期待的未来情景是, 林业生物经济相关企业不断增长, 每年为北卡累利阿地区带来数百个新工作岗位和数亿欧元营业额。同时, 也需要克服一些障碍。目前产量低但价值高的产品适合中国高端空缺市场, 但确定空缺市场, 培养固定商业关系, 建立密切业务往来需要长期和系统的努力。

北卡累利阿地区以森林为基础的循环生物经济具有广阔发展潜力。系统品牌推广可以将北卡累利阿地区打造成不同林业生物经济部门、企业和学术界的国际知识中心。这将有利于北卡累利阿地区经济发展, 也会对林业生物经济的全球可持续性产生深远影响。北卡累利阿地区积累的林业生物经济特长, 将增加其在改善自然资源可持续利用领域的全球影响力。

**关键词:** 生物经济, 林业生物经济, 木材产品, 非木质林产品, 林产品, 基于自然的旅游, 北卡累利阿地区, 中国

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This report is a result of the KIBIO (North Karelia – China cooperation in forest bioeconomy development) project. The aim of KIBIO project was to support the forest bioeconomy development in North Karelia region, optimise forest bioeconomy value chains and increase the capacity of the region's forest bioeconomy sector. Particular attention was paid on SME's ability to respond to the growing Chinese markets and interests on forest bioeconomy. KIBIO focused on three forest bioeconomy sectors: wood products, non-wood forest products, and nature-based tourism. The project is funded by the Regional Council of North Karelia through the European Regional Development Fund (project number A75112) and run between 9/2019 and 6/2022. The project was executed by European Forest Institute (EFI) and Natural Resources Institute Finland (Luke).

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# Contents

<b>1. Introduction.....</b>	<b>9</b>
1.1. Bioeconomy in North Karelia, Finland .....	9
1.2. Bioeconomy sectors.....	10
1.3. Collaboration between North Karelia and China.....	11
1.4. Objectives .....	13
<b>2. Data and methods.....</b>	<b>14</b>
<b>3. Developing the value chains in the wood product sector .....</b>	<b>17</b>
3.1. Potentials of wood product sector in North Karelia and in China.....	17
3.2. Strengths and weaknesses of Finnish and North Karelian wood product companies in the Chinese markets .....	18
3.3. Opportunities to enhance business collaboration.....	19
3.4. New value chains for wood product sector.....	20
<b>4. Developing the value chains in the non-wood forest products sector .....</b>	<b>22</b>
4.1. Potential of non-wood forest products sector in North Karelia and China .....	22
4.2. Strengths and weaknesses of Finnish and North Karelian NWFP companies in the Chinese markets .....	23
4.3. Opportunities to enhance business collaboration.....	25
4.4. New value chains for the NWFP sector .....	26
<b>5. Developing nature-based tourism in North Karelia .....</b>	<b>30</b>
5.1. North Karelia as a nature-based tourism destination.....	30
5.2. Tourism companies' development plans related to offerings and target markets.....	31
5.3. Tourism firms' perspectives on issues influencing the development possibilities and interests .....	33
5.4. Development ideas for thematic nature-based tourism products.....	35
<b>6. Added value from combining the bioeconomy sectors: case sauna .....</b>	<b>39</b>
<b>7. Future scenarios and their implications in North Karelia .....</b>	<b>41</b>
<b>8. The way forward .....</b>	<b>48</b>
<b>References.....</b>	<b>50</b>



# 1. Introduction

## 1.1. Bioeconomy in North Karelia, Finland

North Karelia, which is located in the coniferous boreal forest zone in the easternmost part of Finland, is an example of a resource rich NUTS3 level region in the north of Europe. North Karelia is one of the 19 regions in Finland and has the size of approximately 2/3 of Belgium. North Karelia is also an example region where development is mainly concentrated in the regional capital city Joensuu and its surroundings. Population growth is negative in the areas outside the travel-to-work area of Joensuu (Regional Council of North Karelia 2021). Among the 12 municipalities of the region, only Kontiolahti, which is located next to Joensuu, has a steady positive development in population. A decrease in total population has taken place and is projected to be the most severe in the most remote areas in the future (Heräjärvi *et al.* 2021).

North Karelia has a strong bioeconomy sector. The forest bioeconomy success story is not a co-incidence but a result of 40 years of determined work. The economic importance of forest bioeconomy in North Karelia is significantly higher than the average in Finnish regions (Lehtoviita & Tenhola 2021). Nowadays, 35 percent of the annual turnover and 5–10 percent of the jobs in the region are based on forest bioeconomy. In the wood products sector (including furniture), there were approximately 120 businesses with an employment effect of over 1,200 man-years in North Karelia in 2019 (Ministry of Economic Affairs and Employment of Finland 2021). The total turnover of these companies was over 480 million euros. Regarding the non-wood forest products sector, there were 34 companies in North Karelia in 2019 (Ministry of Economic Affairs and Employment of Finland 2019).

North Karelia is globally known by the forest bioeconomy research and education, led by activities of Natural Resources Institute Finland, University of Eastern Finland, European Forest Institute, Finnish Environment Institute, Karelia University of Applied Sciences, and Riveria Vocational Education and Training Centre. The region employs approximately 600 forest bioeconomy experts in research and education organisations. In addition to a leading position in forest research, the region focuses on multi-disciplinary approach to develop novel tangible and intangible product and service innovations around the bioeconomy sector. The development strategy of North Karelia 2040 states that forest bioeconomy creates the biggest opportunities for the region to develop (Regional Council of North Karelia 2020). The North Karelian bioeconomy actors rely on interdisciplinary and cross-sectoral development that has proven to be a productive way to create high value-adding business, *e.g.*, in cascade use of materials. The region's development is also partly boosted by state-led innovation policy and regional development projects that have supported particularly the bioeconomy-related activities.

Despite of the positive development of the bioeconomy sector, the projected population development sets a real challenge for the aging and shrinking municipalities and poses a threat for economic development of the region. For instance, the forest resources are increasingly being utilised through the labour force living in the municipal centres and foreign labour force coming from abroad, because the supply of competent labour in the distant and core rural areas has been on the decline (Lehtonen & Tykkyläinen 2008). However, in the future the labour shortage will also be severe in the municipal centres.

## 1.2. Bioeconomy sectors

The *wood product sector* uses logs as its main raw material. It includes sawmilling and the production of, *e.g.*, particle and fibreboards, plywood, construction materials and furniture. Pulp and paper are not part of the traditional wood products sector, and the energy use of wood is also excluded. In Finland, the economic importance of wood products industry is high, and the sector is an important employer. Finland is also one of the biggest exporters of sawnwood in the world. In North Karelia, there are over 100 companies operating in the wood products sector and it employs approximately 1,200 persons (Wallius *et al.* 2020). Apart from four large sawmills and one plywood factory operating in the region, the companies are typically small or medium-sized with a focus on the domestic markets. The export of wood products from North Karelia to China has been low.

Construction with wood has been emphasised by regional strategies in North Karelia to make the construction sector more sustainable and contribute to achieving carbon neutrality by 2040 (Kontio Korpi & Rauhala 2018). According to Statistics Finland, the region of North Karelia accounted for approximately two percent of the volume of completed buildings in Finland in 2018, which corresponds to the share of region's population from the population of Finland. In total, 39 percent of the volume of completed buildings had wooden load bearing frame in the region of North Karelia in 2018. There were seven producers of wooden houses, with a combined annual turnover of approximately 4.4 million euros, in the region of North Karelia in 2017. All producers are SME's, and most of them are small family-owned companies with less than ten employees.

Finnish *non-wood forest products* (NWFPs) include, for example, forest berries, mushrooms, birch sap and wild herbs. Non-wood forest products are typically collected for traditional household use, *i.e.*, food (Lovrić *et al.* 2021), but they are also sold, exported or utilised as a raw material in, *e.g.*, pharmaceutical, wellness or cosmetics products. North Karelia is a popular area for collecting non-wood forest products. According to the national statistics, a large proportion of the total Finnish berry and mushroom production is collected in eastern Finland (The Finnish Food Authority 2021). In whole Finland, the annual yield of forest berries amounts to 500 million kilograms (kg), of which currently only 3–10 percent is collected (Turtiainen *et al.* 2015). For the region of North Karelia there are no exact statistics on the amounts of non-wood forest products collected, but in 2020 approximately 4.3 million kilograms of forest berries were collected for commercial use in the whole Eastern Finland (The Finnish Food Authority 2021). Of the harvested berries, the major share is used by the households and less than 30 percent is commercially sold or further processed for industrial use (Ministry of Agriculture and Forestry of Finland 2021). Berry collection for commercial use involves a lot of seasonal workers, mainly from abroad during the summer months. A small part of the harvested berries is exported. Most berries are exported as raw materials without further processing or as frozen berries, among others also to China. Mushroom picking is also a popular activity in North Karelia. Most of the collected mushrooms are used by the households themselves and only a small part (10–20%) is sold commercially (547,000 kg in Eastern Finland / 566,000 kg in whole Finland in 2020) and approximately 7–10 percent of this is exported (43,000 kg for whole Finland in 2020) (The Finnish Food Authority 2021). In North Karelia, there are tens of companies active in collecting and processing a variety of non-wood forest products such as berries and mushrooms, chaga and birch sap. Most of these are small family-owned companies with 1–10 employees.

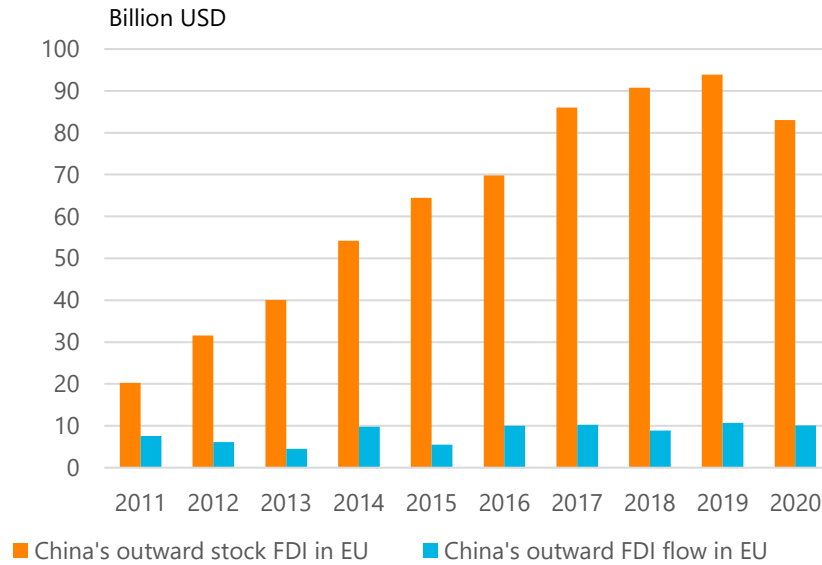
*Nature-based tourism (NBT)* is a tourism activity that takes place in natural settings (Hall & Boyd 2005, Newsome *et al.* 2002). NBT definition is manifold, however, the definitions include

four themes: visiting nature areas, experiencing natural environment, taking part to an activity, as well as normative components related to sustainability (Fredman *et al.* 2009, Hall & Boyd 2005). NBT is an important and growing land-use activity in many parts of Finland (Fredman & Tyrväinen 2010). As NBT relies primarily on natural environments, settings and attractions (Black & Crabtree 2007), it is very dependent on beautiful, attractive and diverse natural environment (Tyrväinen *et al.* 2018). NBT firms are mainly micro and small-sized, including part-time entrepreneurship, and located in rural areas (Fredman & Tyrväinen 2010, Komppula 2000), and the companies provide diverse leisure activities in nature (Fredman & Tyrväinen 2010). In Finland, the NBT sector employs approximately 33,800 people which is 10 percent of employment in Finnish bioeconomy sector (Tyrväinen *et al.* 2018).

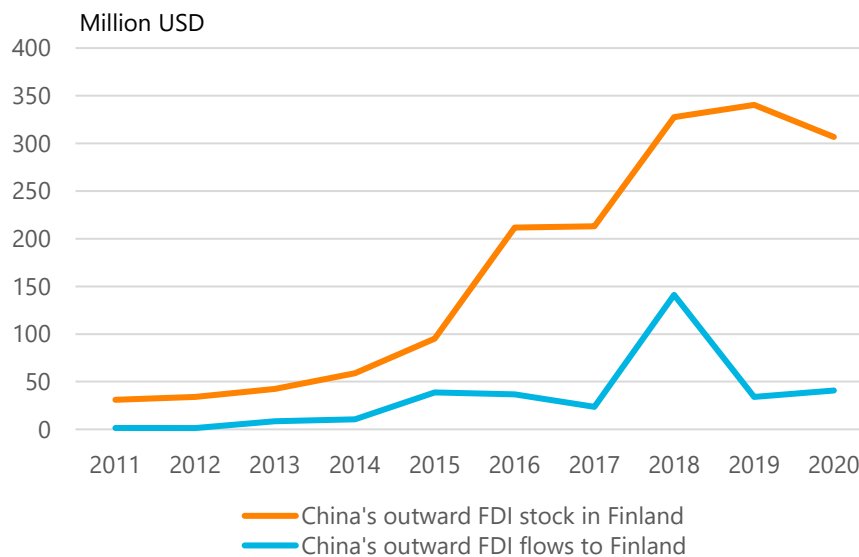
In North Karelia, nature-based tourism is perhaps the most important form of domestic and international tourism. Nearly 90 percent of the land area is covered by forests and there are over 2,000 lakes in the region. North Karelia has four national parks, Koli National Park being the fourth-most popular national park in Finland in terms of visitors annually (Metsähallitus 2021). Therefore, most tourism offerings base on nature in one way or another. In 2019, there were 529,000 registered overnight stays in North Karelia. 71,400 overnight stays were registered by international visitors (13.5 % of total overnight stays). The biggest incoming nationality was Russia (4.5% of all overnight stays), followed by Germany (1.7%) (Visitory 2021). Chinese travellers registered 2,000 overnight stays (0.4%) in 2019. The number was higher than in 2018, mostly due to big educational travel groups visiting North Karelia during summer 2019. COVID-19 resulted in a considerable decrease in all travels but international ones, in particular, in 2020. In total 416,000 overnight stays were recorded in North Karelia in 2020, out of which 34,600 by international travellers (8.3% of total). Russia and Germany were again the biggest nationalities, while Chinese travellers registered only 184 overnight stays (Visitory 2021).

### 1.3. Collaboration between North Karelia and China

According to Wallius *et al.* (2020), China represents a large but quite modestly utilised market and collaboration potential for the Finnish forest bioeconomy actors. In North Karelia, the collaboration with China in forest bioeconomy development has not been very active. Even though the wood products sector in North Karelia is regionally and nationally important, the actors are typically small or medium-sized and no significant export to China has been identified (Wallius *et al.* 2020). Extensive forests in North Karelia offer numerous opportunities for the non-wood forest products sector, with synergies to nature-based tourism. Frozen berries, especially bilberries, have been exported to China, but there is a lack of value-added products and their export to the growing Chinese markets. Moreover, North Karelian companies could attract more Chinese investment than they currently have been able to. China's overseas investments increased markedly over the last decade. At the end of 2020, China's outward Foreign Direct Investment (FDI) stock was distributed over 189 countries (regions) and reached an historic record of 2.58 trillion USD. For Europe, China's investments amounted to 83.02 billion USD (Fig. 1). China's investments in Finland also increased in the past decade and amounted to 306.62 million USD in 2020 (Fig. 2).



**Figure 1.** China’s outward foreign direct investments (FDI) to EU. Sources: Statista (2022), China Outward Foreign Direct Investment Report, Ministry of Commerce (2020).



**Figure 2.** China’s outward foreign direct investments (FDI) to Finland. Source: China Outward Foreign Direct Investment Report, Ministry of Commerce (2020).

It must be noted that China’s outward FDI and investment in bioeconomy related areas increased in past decade, but currently this high rate of investments shows signs of slowing down. Even though China and EU concluded historic China-EU Comprehensive Agreement on Investment by December 2020, it is likely that in the near future this high rate of overseas investment will not continue, as both sides enforced more strict regulations on incoming and outward capital flow.

In terms of nature-based tourism, North Karelia as a region has a lot to offer from forests and lakes to national parks and historic sites, but the number of Chinese tourists visiting the region has been low. Recently, there has been growing interest for educational tourism which can be easily linked with the elements of nature-based tourism, but the number of individual Chinese tourists could be greater. The nature-based tourism sector is naturally strongly affected by COVID-19 and recovery is expected only in the future. Nevertheless, in all three bioeconomy sectors, there is clearly untapped potential and opportunities for growth. Co-operation between sectors is needed in order to create synergies and enable regeneration of new business opportunities. Trade-offs in the use of natural resources such as forests can cause conflicts, which in turn can be solved with strong collaboration and dialogue.

## **1.4. Objectives**

This report analyses the development possibilities of North Karelian bioeconomy. The opportunities for North Karelia – China co-operation are analysed in the three sectors of forest bioeconomy: wood products sector, non-wood forest products sector, and the nature-based tourism sector. The starting point and the background for the bioeconomic co-operation between North Karelia and China were presented in a literature review and state of the art report in Wallius *et al.* (2020). The main points of that study were utilised when mapping the next steps to receive more concrete prospects and ideas for further development. For this report, multiple interviews and questionnaires were carried out in Finland and in China to create understanding regarding the bioeconomy development. Moreover, this report illustrates possible future scenarios for the bioeconomy development in the region of North Karelia, Finland.

## 2. Data and methods

The data was collected by conducting online questionnaires and interviews for both Finnish and Chinese companies and experts in all the subsectors under examination. In terms of *product-based sectors* (wood products and non-wood forest products), an online questionnaire was first sent out to approximately 50 Finnish companies representing both NWFPs and wood products. After receiving no more than five responses (response rate 10%), the information was complemented by structured expert and company interviews in Finland (see: Table 1). The interviews lasted approximately 30–90 minutes each and were conducted online. Moreover, 17 Chinese wood products companies were interviewed. These interviews were semi-structured and lasted approximately 40–60 minutes each. To avoid misunderstandings, the interviews were conducted in Chinese by a native Chinese speaker. Additionally, five Chinese experts were interviewed from the product-based sectors, representing, *e.g.*, business advisors and researchers.

The interviews were conducted confidentially, thus the names of companies or experts will not be published. The Finnish interviewees represented small or medium-sized companies with extensive experience in the production of wood products or NWFPs. Some companies focused only on the Finnish market, but some exported their products for example to China. The experts and researchers interviewed were also working under same issues. Interviews and surveys for the product-based sectors were conducted during the spring of 2021.

In *nature-based tourism* context, entrepreneurs and representatives of tourism service providers were interviewed to map the existing nature-based tourism offering and to increase understanding of the future development plans in the field. In total, nine North Karelian companies were interviewed in October and November 2020. The interviewees were selected with the help of the regional destination management organisation, and the firms were expected to have an interest towards Chinese (or Asian) markets. Additionally, the selected firms were expected to have interest in developing sustainable nature-based tourism services. The interviews were semi-structured, lasted approximately 60–80 minutes each, and were conducted face-to-face or via phone/online tools.

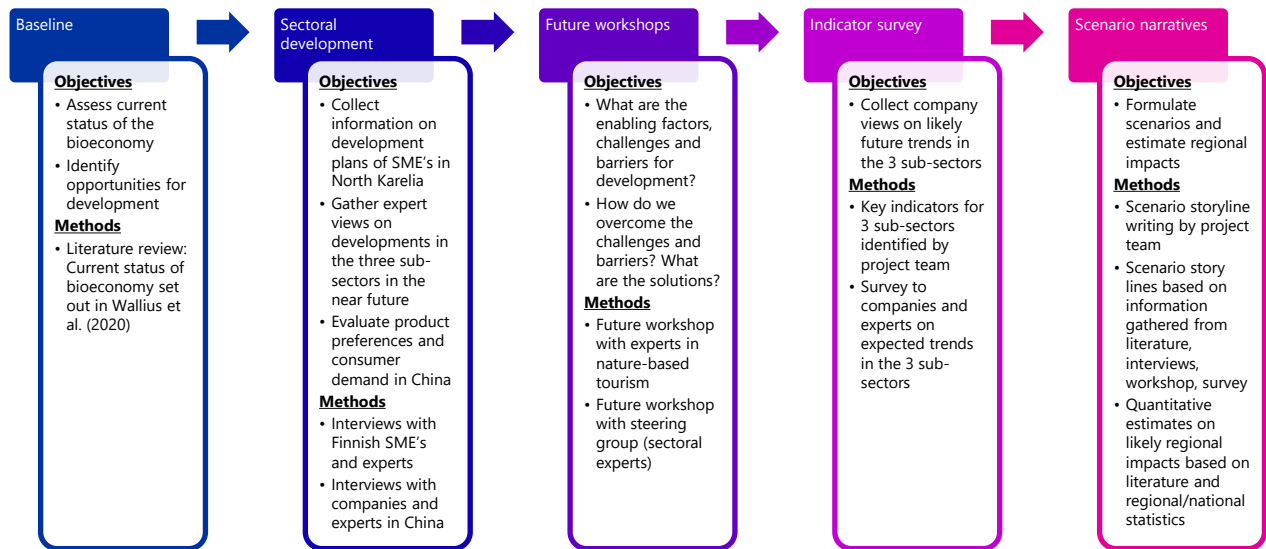
Moreover, data was collected from two workshops organised by the project. One workshop focused on finding future solutions to challenges faced by the nature-based tourism sector, creating new opportunities for development in changing operating environment. Four experts with knowledge on future studies were invited to participate in the workshop. The results were also utilised in creating the scenarios and drafting the change forces. Another workshop was organised for the members of the project steering group and focused on building and defining the chosen scenarios.

Finally, company and expert insights for impact assessment were gathered from all three sectors by an online questionnaire that produced 31 responses. Table 1 summarises the interviews, workshops and questionnaires.

**Table 1.** Summary and description of data collection methods.

Category	Location	Number of interviewees	Data collected	Method
Wood and non-wood forest product companies	Finland	5	Autumn 2020	Online questionnaire
Wood products companies	Finland	3	Spring 2021	Structured online interviews
Wood products experts	Finland	3	Spring 2021	Structured online interviews
Non-wood forest product companies	Finland	4	Spring 2021	Structured online or face-to-face interviews
Non-wood forest product experts	Finland	3	Spring 2021	Structured online interviews
Wood products companies	China	17	Spring 2021	Semi-structured online interviews
Wood products experts	China	4	Spring 2021	Semi-structured online interviews
Non-wood forest products experts	China	1	Spring 2021	Semi-structured online interviews
Nature-based tourism companies	North Karelia	9	Autumn 2020	Semi-structured online, phone or face-to-face interviews
Future studies experts	Finland	4	Autumn 2020	Participatory workshop
Project steering group members	North Karelia	3	Spring 2021	Participatory workshop
Companies and experts (all three sectors)	North Karelia	31	Summer 2021	Online questionnaire

Scenario analysis was used to assess the future development paths of bioeconomy co-operation between North Karelia and China. As depicted in Figure 3., the scenario building approach consisted of several sequential steps such as 1) assessment of current status of the bioeconomy and identification of opportunities, 2) evaluation of sectoral development, 3) analysis of enabling factors and challenges, and how to overcome these, 4) analysis of likely future trends and 5) formulating scenario narratives.



**Figure 3.** Participatory scenario approach to define desirable and undesirable scenarios for North Karelia's forest bioeconomy development.



### 3. Developing the value chains in the wood product sector

#### 3.1. Potentials of wood product sector in North Karelia and in China

During the last fifteen years, China has participated actively in international roundwood and forest products trade and markets. China is not able to meet the increasing demand for raw materials and intermediate goods with domestic resources, thus the import volumes have increased considerably. For wood processing industries, this has resulted in increased import of roundwood and pulp chips from Asia (*e.g.*, Vietnam, Malaysia, Indonesia), New Zealand, and Russia, as well as sawnwood imported from all over the world, including Finland.

As discussed in more details in Wallius *et al.* (2020), the forest products trade between Finland and China has concentrated mostly on pulp trade. Approximately 80 percent of the value of the forest products trade consists of bleached softwood sulphate pulp. The exports of the wood products industries from Finland to China have consisted almost exclusively of exports of spruce and pine sawnwood. As much as 683,000 cubic meters (m<sup>3</sup>) of spruce and 250,000 cubic meters of pine sawnwood were exported to China in 2020. In the absence of regional foreign trade statistics, there is no precise information on exports of forest products from North Karelia to China. However, as the interviews indicated, some companies in North Karelia export to China, including sawnwood and preservative impregnated lumber.

In the future, China's target of carbon neutrality by 2060 supports the continuing growth of wood construction. In the 21<sup>st</sup> century, the wood construction market has already grown rapidly with the supporting policies, such as new standards, and raw material produced in plantation forests (Zhou 2012). China will continue to promote green construction projects in both urban and rural areas to reduce the emissions. Green construction – which is referring to a wider concept, not specifically to wood construction – is an important tool for the development of economic, ecological and social sustainability and health (Ando *et al.* 2005, Zhao *et al.* 2015). Similarly, the interest of Chinese middle-class consumers in wood construction and bio-based materials is growing. Some consumers are already willing to pay a premium for working or living in modern wooden buildings (Luo *et al.* 2018). The younger generations have a more positive attitude towards wood construction and other sustainable construction than the older ones. As a result, China's potential as a market for wooden buildings is generally growing with strategies to promote the bioeconomy and revitalise rural areas, as well as consumer-driven demand. The major practical obstacles are related with building codes, city planning rules, as well as cultural factors that may hinder or even prevent the use of wood in, *e.g.*, load bearing structures or claddings in urban construction or larger buildings. Hence, the most rapidly realizable market potential lies in non-structural outdoor (decking, fencing, light garden structures, etc.) and interior applications (floorings, cabinetry, furniture, saunas, etc.). The experts in China stated that increasing Chinese housing market will most likely create possibilities for Finnish wood products companies and strengthen business co-operation between Finland and China.

An existing large market for modern wood construction (*e.g.*, cross-laminated timber, construction logs) was identified in Chinese holiday resorts. Wellness centres, spas and similar resorts have been built and are continuously being built despite of decreased leisure travelling. The

infrastructure is predominantly built with wood. Some Finnish log house manufacturers are active in those markets already, but the demand is apparently large and still increasing.

The results indicate that COVID-19 pandemic has had no major effect on business and trade of Finnish wood product SME's. Companies adapted to the changed market situation by changing working hours and shifts and increasing the flexibility of production. One company answered that Finnish products are now valued more than before COVID-19, having a positive impact on the sales. Another company highlighted that the do-it-yourself (DIY) trend and culture has been increasing drastically during the pandemic. On the other hand, a rise in freight prices to distant countries was mentioned as a negative issue. China was mentioned as one potential trading partner with many operational uncertainties and tight competition.

### **3.2. Strengths and weaknesses of Finnish and North Karelian wood product companies in the Chinese markets**

Quite expectedly the image of nature and cleanliness was mentioned among the interviews when analysing the competitive advantages of Finland and Finnish products. When considering Finnish wood products, the high quality as well as health and cleanliness properties of forest products were features, which were mentioned among the respondents both in Finland and in China. For example, Norway spruce, which is used to manufacture children's beds and toys was appreciated as being of high quality – the "Nordic clean and healthy spruce" is an important selection criterion when parents are choosing child's furniture. Health aspects were emphasised in many answers: boreal trees live long and grow slowly compared to trees in temperate conditions. Therefore, boreal wood is seen as a material with high contents of health-supporting compounds and antioxidative, antiviral, and antibacterial properties. Chinese experts also highlighted the fact that Finnish wood raw materials come from sustainably managed and certified forests.

Nordic functional design of furniture and interior decoration materials has recently been an emerging fashion among the younger generations and growing segment of middle-class consumers in China. According to one interview, this fact has not yet been fully understood or commercially utilised in Finland, and thus not operationalised by the Finnish marketers and agents in China. Knowledge on new technologies related to, e.g., cross-laminated timber CLT, new biorefinery products, textile fibres, and clean tech were regarded as competitive advantages of the Finnish companies.

When asking respondents, the possible weaknesses or barriers which restrict either the awareness of Finnish wood products in Chinese markets or complicates daily business with Chinese, the cultural differences and, especially, the business culture were emphasised almost in every answer. Finnish companies and their representatives lack understanding on the Chinese way of thinking and executing business, which includes management level face-to-face meetings and personal contacts. While this typically requires long lasting presence, companies need to be ready to have a representative spending time in China, networking and creating business relationships. For SME's this may not be possible. The respondents recommended that information on Chinese markets, business culture, and knowing the key persons need to be shared between the companies. Moreover, the role of public sector in promoting export to China was highlighted. On the other hand, Chinese experts, as well as company representatives, found Finnish companies to be trustworthy business partners with a good reputation.

The data also revealed that Finnish wood products need to be branded and marketed as premium products from premium raw materials, strongly utilising the positive image of Finland. The products need to be sold with a good story, emphasising, *e.g.*, the ecological and environmental aspects of Finnish products compared to others. The marketing efforts could be targeted to high-end consumers and niche markets, such as children's furniture. Megatrends strongly affect Chinese markets and Chinese consumers are typically interested in new products, such as CLT, LVL, and durable modified wood products. The companies need to quickly react to changing consumption trends in order to create business in China: the first companies to enter the markets have huge advantage in taking over the whole market.

Other issues to bear in mind before entering the Chinese market include intellectual property rights (IPR) and related legislation, as well as other policy conditions and regulations that affect operating in Chinese markets. While new policies mainly create opportunities for companies importing, *e.g.*, wooden construction materials, the regulation and normative environment (concerning especially fire safety regulations for wood construction) in China are very complex. Currently, it can be extremely challenging to get a permit for building a multi-storey wood-frame building for residential use. Several respondents also warned that copying products in China is rather common and difficult for a foreign company to intervene and prevent.

Some answers were emphasizing a more customer-friendly approach and ambition, flexibility and willingness to change and adapt new products and dimensions according to the prevailing demand. One respondent said that Finns may try to sell "too good products" to the Chinese retailers. For example, strength grading of even structural wooden components is unnecessary according to Chinese building codes (on the other hand, only seldom wood is used as a structural material). Structural components may be visually inspected (knot size etc.) after the installation but not before it. Therefore, non-graded normal Finnish spruce lumber is sufficient for most applications, and there is no demand for strength-graded lumber.

Several respondents also underlined that there are a number of factors affecting markets and trade, which cannot be influenced. For example, changes in international political decision making and trade policy can quickly affect trading opportunities in China. Adapting to this requires perseverance, long-term thinking and strategies of the companies. It became clear in the interviews that one big, if not the biggest, disadvantage of Finnish wood products is the relatively high price level. This was highlighted by both expert in Finland and in China, as well as Chinese companies importing products or raw material from Finland. Most Finnish companies are not able to compete in Chinese markets in terms of price with other major exporters such as Russia and Canada, and the Chinese consumers' willingness to pay premium can be low. This problem, however, is related to general national cost competitiveness and exchange rates and is difficult for an individual firm to influence. On the other hand, the production volumes of Finnish companies can be too low for Chinese markets. Typically, Finnish companies have diverse product portfolios and a number of customers in a number of countries, therefore, they are not able to provide Chinese resellers as many products or as much raw material as needed. The limited wood species portfolio was seen as a weakness in Finland, as well.

### **3.3. Opportunities to enhance business collaboration**

Despite many challenges, there are also multiple opportunities for enhancing business collaboration between North Karelia and China. Current societal change and megatrends in China are in favour of increasing demand for many kinds of wood products and, therefore, support

and create possibilities for Finnish and North Karelian wood products companies, especially in wood construction, new interior decorations and design solutions and CLT. In recent years, China has had a strong policy support to develop the industry and urge to get the cutting-edge, innovative ideas, clean tech and other new technological solutions coming into China.

The problem for North Karelian companies is that typically the size of the firms is small, the production volumes from the perspective of the Chinese customers are small, there is lack of contacts and barriers on language skills, and the knowledge of business models to operate in China is insufficient. To overcome these issues, many respondents recommended that the firms should co-operate by forming networks between different industries. For example, around the construction sector there could be a cluster including professionals from different sectors, such as environmentally friendly innovative wood construction, digitalisation, electrical engineering, design and interior design solutions. Health services, as discussed among others by Muilu-Mäkelä *et al.* (2021) in detail, could be more emphasised in marketing and brand building. Especially, any new application connected to the most recent technologies arouses interest among Chinese companies. The various lighting and alarm systems in wood construction are examples of such technologies. According to many answers, one way to enter the competitive Chinese market could be that SME's participate in numerous joint marketing events and markets in China and thereby make the product known and share the information of recent technical possibilities connected to wood products. The knowledge and contacts of Business Finland was seen to be good starting point for companies when thinking to establish in the Chinese markets. Also, the utilisation of existing networks, such as twin town networks between Finland and China, was mentioned as a one solution to share information of Finnish wood products and their attractiveness.

Even though nearly all lumber exported from Finland to China is non-planed sawnwood that can be used for a variety of purposes, quality-oriented markets create opportunities for Finnish and North Karelian wood products companies. Finnish Scots pine is visually different from Central European, Siberian and New Zealand pines and is increasing its market especially in the furniture sector. Spruce sawnwood, on the other hand, is often regarded as healthy material with no emissions and is thus utilised in *e.g.*, children's furniture. More research data for health and well-being effects would be needed to further support this image. Wood is typically not used in residential buildings in China. However, the public sector may use some wood, and interest towards wood has considerably increased in holiday home and resort building.

Another co-operation possibility between North Karelia and China could be to add opportunities to attract Chinese investments into North Karelia. Although China has become more cautious in recent years in financing foreign investment and has, for example, withdrawn from financing some large biorefineries, it is still possible to obtain technology-intensive and clean tech investments in particular. According to the respondents, utilising existing networks, *e.g.*, twin city agreements, could be a good starting point for finding interested partners here as well. However, it has been also noted that strict regulations in Finland can sometimes cause difficulties when attracting investments.

### **3.4. New value chains for wood product sector**

Pulp, sawnwood, and birch plywood are traditional export products from North Karelia. In addition, smaller volumes of glulam beams, as well as planed and preservative impregnated wood products, are rather regularly exported to China. These could be described as mature products

and established lines of business, whereas more novel wood products often face difficulties in export. A number of previous regional development projects, carried out during the 2000s, have evaluated the export potential of, *e.g.*, wood construction elements, log houses, tremor-safe structures, and emergency accommodation solutions from North Karelia to China and other far-east Asian countries. None of these projects has resulted in regular export business of greater magnitude. The main challenges, which have prevented business development, have been identified in price and logistics. Furthermore, the producers of higher value-added products have been hesitant to enter the Chinese markets because of potential intellectual property right (IPR) issues. Therefore, export of primary processed products, such as ungraded sawn-wood, has been and still is a feasible and secure solution for the Finnish companies. Many small and medium-sized companies are, furthermore, reluctant to access China because of the expected market size. Often the production capacity is adjusted based on domestic demand, and the big orders of Chinese customers might cause a need to either capacity growing investments or leaving other customers unserved.

According to the experts interviewed, however, some potential novel wood product value chains were identified. Some of these value chains were directly suggested by the interviewees while others were derived by the researchers after discussions with Chinese and Finnish experts. In order to keep the business viable and in own hands, *i.e.*, avoiding for example intellectual property rights (IPR) issues, three conditions were identified when considering the future wood product value chains. Firstly, if the business idea is based on some specific characteristics of local raw materials, it cannot be copied or completely outsourced from the region. Secondly, if the business idea is based on a specific technology or skill that is difficult to copy or, combined with the local raw material supply, impossible to copy, the export can be built on quite safe basis. Thirdly, if there is an insufficiently commercialised brand potential that is all-out unique for Finland, it makes up a potential platform for permanent business for the Finnish products.

The interviewed professionals mentioned and highlighted few wood products as examples, which could have potential for improving the value chain and promote wood-based business between North Karelia and China. Those suggestions were concerning 1) thermally modified timber, 2) wood-plastic composites and 3) sauna concept. However, even though none of these products cannot strictly avoid all the conditions listed above, the utilisation and further processing of North Karelian wood would increase the degree of processing, improve employment and increase revenues to the region. However, the exact effects and magnitudes are difficult to assess, while the economic circumstances are highly dependent on, for example, the scale of production.

## 4. Developing the value chains in the non-wood forest products sector

### 4.1. Potential of non-wood forest products sector in North Karelia and China

Non-wood forest products are an important provisioning ecosystem service of forests in China. Non-wood forest products allow farms and families in poor rural areas to earn additional income (Zhaobang 1995). China and India are the world's largest producers and consumers of non-wood forest products (FAO 2000). In China, the production and demand of natural- and non-wood forest products such as food, traditional medicinal products and herbs has increased markedly over the last decades. However, the demand in China for non-wood forest products is exceeding its domestic production and the country is also among the world's largest importing countries of non-wood forest products.

In Finland, there would be opportunities to increase the utilisation of berries and mushrooms as a large share of the annual production is not collected from forests (Wallius *et al.* 2020). The annual crop of Finnish forest berries amounts to 500 million kg, of which only 3–10 percent is collected (Turtiainen *et al.* 2016). Approximately 50 varieties of wild berries grow in Finland, of which 37 are edible. Of these, 20 varieties are suitable for picking and consumption (Tikkanen 2015). The best known and commercially most valuable berries are lingonberries, crowberries, bilberries, cloudberries, raspberries, cranberries, and sea buckthorn. Bilberry is the most important export berry in Finland.

Some innovative Finnish businesses have specialised in producing berry products, like powders, dried berries, smoothies, shots, cold pressed juices, liquors, extracts and snacks, and some of these companies are located in North Karelia. One of the key export markets for Finnish berries is Asia, where consumers are interested in the healthy properties of berries as superfoods. However, most of the Finnish berries are exported as frozen berries without further processing, and most of the value created by further refining occurs in the export destination. In Finland, as well as in the region of North Karelia, there would be opportunities for adding extra value by increasing the level of processing of berry products.

Ceps *Boletus edulis* and *Boletus pinophilus* are the most exported mushroom species from Finland. However, mushrooms are currently not exported to China in any large amounts. Some innovative businesses have specialised in actively cultivating medicinal mushroom species such as chaga *Inonotus obliquus* and reishi *Ganoderma lucidum* mushrooms in Finnish forests. Medicinal mushrooms have been used in traditional Chinese medicine for thousands of years as foods to maintain good health and as medicine to treat disease (Lee *et al.* 2012). Chaga and reishi mushrooms are both used in traditional Chinese medicine because of their high concentration of bio-active components stimulating the human immune system and their related anti-inflammatory, anti-viral and anti-bacterial properties (Sanodiya *et al.* 2009, Lee *et al.* 2012). These mushrooms species are both collected from forests naturally grown as well as cultivated in China, but the country also imports significant amounts of these species as the demand in the functional health-food sector is high and is still growing. Some Finnish companies have tried to export medicinal mushrooms to China, but successes have so far been limited. Some Finnish companies have now specialised in further processing Finnish medicinal mushrooms into powders and extracts what can be used as a food additive or be consumed as tea. Some

companies have explored access to the Chinese markets, but the amounts exported are still very limited.

Birch sap can be extracted from birch trees during a short period in spring. Birch sap can be consumed fresh, and it is also used as an ingredient in the beverage and cosmetics industry. Some companies in North-Karelia have specialised in extracting birch sap from birch stands and have developed methods for storing birch sap for longer periods of time. Collection of birch sap has increased, and its annual production amounts are estimated (unofficially) to exceed two million litres. One company has been able to attract an investor from Hong Kong and has made an agreement for the export of birch sap. Most of the exported birch sap is used in cosmetics industry for skin care products for the Chinese and Japanese market. The company is currently exploring ways how to enter the Asian beverages market as well.

According to the interviews and surveys, the COVID pandemic has had a marked effect on the NWFP sector. As a result of the pandemic, people are more interested in a healthy lifestyle and this resulted in an increased demand of healthy food, and therefore also NWFP's due to their perceived health benefits. However, not all effects of the pandemic turned out positive for the NWFP sector. For example, the pandemic decreased the demand of NWFPs products from the hospitality industry (hotels, restaurants, catering) sector. The COVID-19 pandemic also caused a lot of uncertainty for forest owners. The respondents believe that forest owners were probably more inclined to keep their savings for uncertain times and were therefore less willing to invest in their forest. As a result, the establishment of new areas for chaga and reishi cultivation came to an almost complete stop, and birch sap collection clearly dropped. Companies had difficulties to obtain enough raw material and were hardly able to respond to the normal demand and not at all to the increased demand. In addition, orders from China were less because of uncertainty in the retail sector and companies did not dare to make large orders. This actually also concerned other product sectors with as a general result causing large delays and difficulties in the distribution channels. For some large international companies who are buyers of birch sap, product research and development stopped completely as the companies just concentrated on trying to keep the company running in times of crisis. Berry collection from forest in Finland relies for a major part on the availability of foreign workers and because of the travel restrictions due to COVID, there were not enough pickers in 2020. As a result of the difficulties in collection, distribution, willingness of forest owners, many companies could not reach their production capacity and were forced to implement temporary lay-offs and could hire less seasonal workers. Nevertheless, the companies were hopeful that the situation will improve as soon as the situation with the COVID pandemic eases and all interviewed companies expect moderate to strong growth in the near future.

## **4.2. Strengths and weaknesses of Finnish and North Karelian NWFP companies in the Chinese markets**

In the interviews with the Finnish companies and experts, the cleanness of Finnish nature was always mentioned first as the main competitive advantage of Finnish NWFP's and companies active in the Chinese market. Compared to many other countries, Finland is relatively free of pollution issues, and air and water quality are very high. The results indicate that clean and unspoiled nature is the biggest branding element for Finland. Another positive aspect, directly linked with the presence of clean nature, is that Finland has a very high reputation of quality. These were also highlighted in an interview with a Chinese expert. Finnish NWFP's, especially bilberry products, are seen to have a good reputation – even though still not as good as

products from *e.g.*, USA, Chile and Peru – and good quality. Moreover, the fact that bilberries from Finland are actually picked from the unpolluted nature, not cultivated, creates added value.

It is important that Finland has a strict and reliable food safety inspection. This is especially important for mushrooms, which are bio-accumulators: if there are pesticides or heavy metals present in the environment, they will accumulate in mushrooms. In Finland, the heavy metal concentrations are very low. This aspect has made one Finnish mushroom company successful in the US market, and probably this would also work in the food and health product sector in China. According to some experts, the concentration of bioactive components has been assessed in Finnish natural products, and this was higher compared to products from other countries, *e.g.*, central and eastern Europe and Russia. Also, in birch sap production, quality control and traceability are very important. For each batch, the company knows from which forest stand it originates. Food production and organic production are regulated and certified in a very strict and good way in Finland, and actually in all Nordic countries. In Asian countries, products from Finland and other Nordic countries are therefore generally very much appreciated.

Another competitive advantage for the Finnish NWFP's could be the amount of research efforts invested in product development. It is not just the image of beautiful nature, but the companies really know their product and believe in it. For most products, the origin can be traced and also the chemical composition of the product is known. All these factors together, contribute to the competitive advantage of Finnish NWFP's.

One of the main bottlenecks for North Karelian companies to enter the Chinese market would be to ensure a stable supply of raw material. Despite of the annual variations in crop volumes there is enough raw material available in Finnish forests. However, the supply chains are not developed enough. Even if the NWFP market is relatively small compared to other sectors, demand in China is huge. Raw material supply chains for NWFP's have to be restructured and made more efficient. Most companies in North Karelia are quite small and they can never market and deliver the requested volumes of raw materials by themselves. This does not only apply to the Chinese market, but to the whole international market. Very often buyers go to another country because Finnish companies are not able to deliver sufficient volumes: the volumes delivered should be approximately ten times greater than produced currently. Companies need to grow or establish co-operation to secure industrial scale, stable raw material supply. Furthermore, collection methods, networks, and technologies need to be developed in addition to elaborated raw material knowledge.

The range of different NWFP's is currently too low, and there are many similar products on the market. Product development has been lagging behind in Finland. Too many similar products on the market results in a situation where Finnish companies do not collaborate but rather see each other's as competitors. Access to markets could be searched from identification of own product's niche and start cooperation with other companies. An interviewed Chinese expert verified this: Finnish companies need targeted marketing, find the right niche markets, and create flagship products with premium image, possibly in collaboration with other Finnish companies.

Once companies get entrance to the Chinese market and get started, many cultural differences must be accounted for. The world views and concepts of the people in China and Finland can be completely different. Achieving a sufficient level of cultural understanding takes time. Thus, time is also needed before the cooperation runs smoothly. According to a Chinese expert, it is



crucial for the Finnish NWFP companies to better understand the markets in China and develop appropriate business plans and strategies in order to expand their businesses. Business Finland (BF) can help companies in expanding their activities in the international markets; BF has an office also in China. In general, knowledge and expertise to operate on the Chinese NWFP market is currently insufficient. The few Finnish NWFP companies active in China have succeeded with the help of a Chinese investor. One option for the Finnish NWFP companies would be to find a counter partner, such as a trade company or brand agency in China, to help in branding and marketing. However, the cost might be too high. Finland lacks flagship NWFP's in the Chinese market currently. It would be beneficial to unite Finnish NWFP companies with the help of Business Finland or, e.g., the Finnish Embassy to introduce high quality NWFP's to middle class customers in big cities in China. Another option for Finnish NWFP companies would be to explore sales in supermarkets, which focus on imported food, and online food sales platforms, such as "Chūnbò" (春播) (<https://www.chunbo.com/>).

### 4.3. Opportunities to enhance business collaboration

Despite the challenges, there are many opportunities for companies active in the NWFP sector to increase co-operation between China and the region of North Karelia. The companies should aim at exporting higher value-added products instead of raw materials. This concerns especially berries, which are now frozen and exported without further processing. The share of Finnish NWFP's on the Chinese market could be expanded particularly in the segment of premium products.

Consumer interest and the market for chaga (*Inonotus obliquus*) has grown considerably in China during the last years. Chaga can be further processed into swallowable capsules, tea, or water-soluble preparations. Chinese consumers use chaga especially as tea. Reishi (*Ganoderma lucidum*) is a medicinal fungus used in traditional Chinese medicine. There are already many health and medical products in the Chinese market that contain reishi, and the popularity of these products is still increasing. The Finnish NWFP producers can benefit from the trend of consuming pure and healthy food products, which is increasing in China. However, this requires strong marketing efforts and increasing the Chinese consumer awareness of Finnish products.

Most NWFP companies in North Karelia are quite small and cannot alone respond to the requested volumes in China. Chaga and reishi are mostly collected from the wild and the volumes are rather small. One way to increase the production of high value mushrooms would be to increase cultivation and facilitate networking of growers, collectors, buyers, and further processors.

Companies also need to put more emphasis on marketing and branding. Business Finland and Foods from Finland were seen as a good starting point, but more can be done. Some of the respondents noted that networking events with Chinese companies, for example in terms of Finnish health products, would be beneficial. Furthermore, networking with Finnish companies who have successfully established in China would be useful. Presence at fairs and exhibitions in China is important in order to increase visibility and create new contacts. While this requires quite large investments from individual companies, it would be cost efficient if several companies go together as part of a larger network.

The existing or developing online sales platforms offer new opportunities for the North Karelian companies to operate in and export to China. Some online platforms are, however, expensive

and do not target to the high-end niche market for NWFP's. Therefore, the channels need to be selected carefully.

Attracting Chinese investors could also provide opportunities for developing the NWFP sector in North Karelia. Finnish mushroom processing companies already buy many of their machines from China, If the companies want to increase cooperation with and export to China, further investments in production capacity are necessary. On a global scale, most of the mushroom processing takes place in China, and Chinese mushroom processing machines are considered of high quality. Having a Chinese investor who would also know the mushroom market can provide opportunities for Finnish companies to negotiate a better deal for machinery bought from China. In addition, having a Chinese investor can be an asset for end market sales of Finnish products in China. Companies in China may be interested in investing in Finnish companies to secure the supply of raw material in the near future, also regarding their projected growth. A Chinese investor can also help developing the brand in China, as well as develop the company towards growth in the near future.

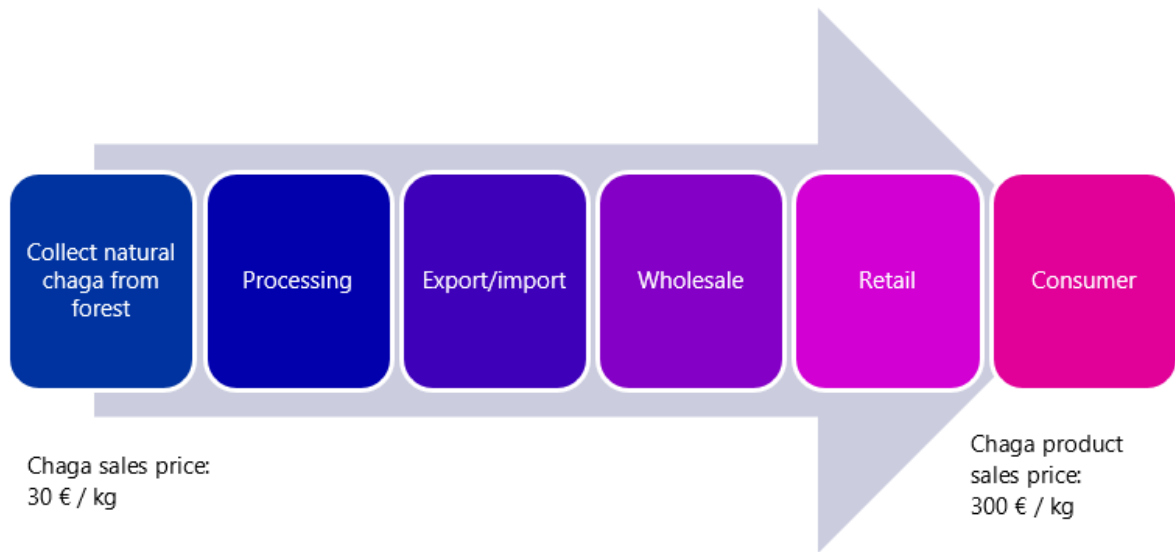
#### 4.4. New value chains for the NWFP sector

##### **Chaga *Inonotus obliquus* (Chin.: *Báihuà rōng* 白桦茸, Fin.: pakuri)**

Birch-based value chains have stayed rather unchanged during the last two decades. In Finland, plywood, pulp, wood-free papers and paperboards together with sawnwood, flooring materials, furniture, facing veneers, firewood and forest residues as chips have formed the backbone for the birch uses (Verkasalo *et al.* 2017). There are however opportunities to increase the raw material value of birch many times through the cultivation of non-wood forest products. Nature-based non-wood forest products, such as natural sap liquids and their derivatives, or high-value specialty mushrooms growing on stems, for example chaga mushroom based products, could provide new value chains for human well-being (Verkasalo *et al.* 2017).

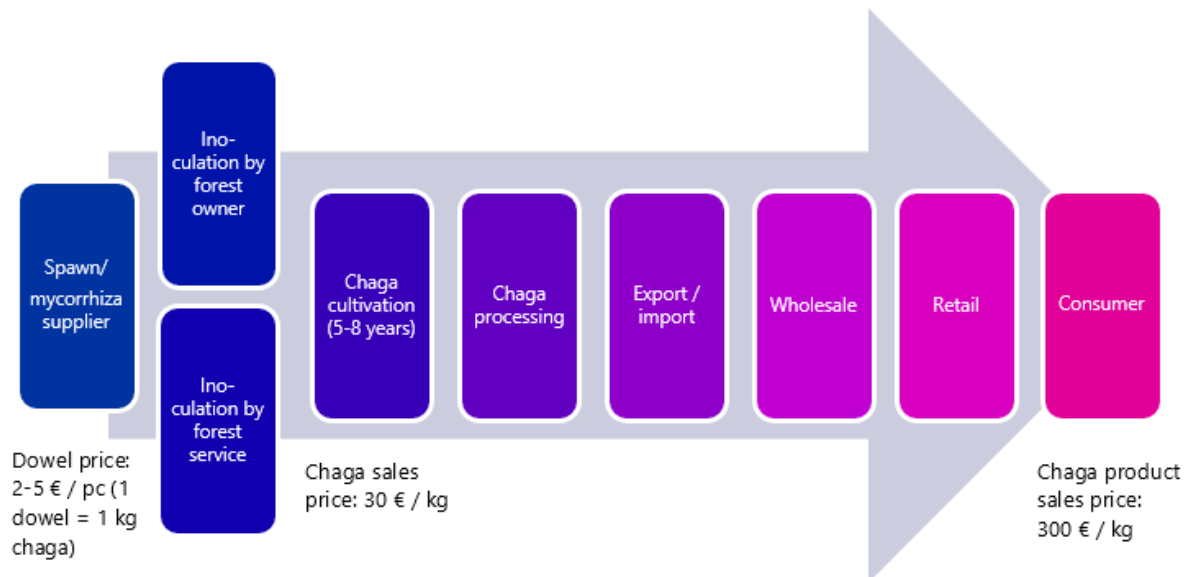
Chaga is a common wood-decaying fungus growing on birch and its possible health effects have been scientifically documented since the 1950s. Chaga mushrooms growing on old birches contain concentrated levels of *Betuline*. For this reason, cultivation possibilities and its feasibility have been the topic of active research (Heräjärvi 2015). Birch itself, more precisely birch bark consists for about one third of *Betuline* which gives birch its white colour. *Betuline* seems to have strong medicinal properties as it can be used as a medicine against parasite infections, certain types of cancer, bacterial and virus infections and disease, and it can even be used as a HIV treatment. *Betuline* has also been observed to have a lowering effect on blood cholesterol levels.

The chaga value chain already exists, but the sales volumes are small in Finland. Most chaga sold in Finland and exported from Finland is naturally grown chaga collected from forests. The value of chaga multiplies 10 times from collecting (fresh chaga 30 €/kg) to final consumption (*e.g.*, chaga powder or chaga tea 300 €/kg) (Piispanen 2017). The most valuable chaga products are sold as instant extract powder or liquid having a price of 1,000 €/kg (Verkasalo *et al.* 2017).



**Figure 4.** Existing value chain of natural chaga. Adapted from Piispanen (2017).

In Finland, there would be opportunities for farmers and forest owners for active cultivation of chaga mushrooms. There exists a large market for chaga in Asian countries. Chaga cultivation can provide a significant income boost for rural entrepreneurs who own forest. Chaga cultivation enables the economic utilisation of low productive (mixed) birch stands not used for forestry purposes. And even more interestingly, by selecting those birches which will be harvested anyway during thinning operations, chaga cultivation can also be combined with conventional commercial forestry which would make it a very attractive alternative for forest owners. Usually, small birches with a diameter of approximately 10 centimetres are inoculated with chaga mycelium by a forest company. Some forest or mushroom companies provide also training in mushroom cultivation after which the landowner would also be able to inoculate the trees by him/herself. Trees are inoculated by inserting a wooden tap (also called dowel) containing the mycelium into small holes which are drilled in the tree. The price of dowels varies from 2–5 euros per dowel and one dowel can produce one kg of fresh chaga. The price of one dowel is only a small fraction of the price of fresh chaga (fresh chaga 30 €/kg) so cultivation could be a profitable activity. Currently, the price of natural and cultivated chaga are similar but time will tell how prices develop in the near future. Uncertainties related to the yields of cultivated chaga still exist, both regarding when the cultivated chaga are ready for harvesting and how much the yield per dowel could realistically be (Miina *et al.* 2021).



**Figure 5.** Value chain of cultivated chaga. Source: Adapted from Piispanen (2017).

Several interviewees told that chaga production in Finland is currently low and China, South Korea and Japan import chaga mainly from Russia. China, South Korea and Japan import chaga as raw material, in powder form, chaga cubes, chaga tea and more processed chaga products. To develop the Finnish chaga value chain, chaga cultivation in Finland needs to be increased to guarantee a more stable supply of both raw material and processed products for the importing Asian countries. A growing demand for raw chaga could be fulfilled by systematic and organised cultivation of the species (Vanhanen *et al.* 2014, Issakainen 2015).

Several interviewees said that producers and retailers in Asian countries (*e.g.*, China, South Korea and Japan) are interested in buying natural products from Finland because of their purity and rather high concentration of bioactive components. The interviewees also stated that importers want to make sure that the raw material and processed products come straight from Finland in order to guarantee the quality of the products.

### **Reishi *Ganoderma lucidum* (Chin.: *língzhī* (灵芝), Fin.: *lakkakäppä*)**

In addition to chaga, there is an interest in South Korea, Japan and China for another medicinal mushroom species called reishi *Ganoderma lucidum*. This species can also be cultivated in Finnish forests using similar techniques as for chaga. Reishi has been widely used as a tonic and to treat various diseases, including chronic hepatopathy, hypertension, neurasthenia, insomnia, bronchitis, gastric ulcer, diabetes, and cancer in China, Japan, Korea, and other Asian countries for more than 2,000 years (Sanodiya *et al.* 2009). Because of its presumed health benefits and apparent absence of side effects, reishi has attained a reputation in the east as one of the most powerful medicinal fungi. The medicinal value of reishi has been described in ancient Chinese texts (Sanodiya *et al.* 2009 and references therein). Currently, ancient traditional Chinese medicine remedies are reinvestigated using modern scientific methods to assure their efficacy and safety and develop them as dietary supplements as well as new medicines (Lee *et al.* 2012). Reishi mushrooms are very rare in nature and the amounts collected are not sufficient for commercial exploitation (Sanodiya *et al.* 2009). Therefore, the cultivation of reishi has become an essential aspect to meet the increasing demands in the international market.

Some Finnish companies offer services to private forest owners to cultivate this mushroom species in Finnish forests. There would be opportunities for Finnish forest owners to increase production of reishi mushrooms, in a similar manner than with chaga. The difference of the reishi mushroom to chaga is that reishi cultivation does not demand living trees, it can be inoculated to dead trees and perhaps even to stumps. This characteristic can be a good opportunity to combine forest harvesting activities (thinning) with mushroom cultivation. In addition, this gives opportunities for increasing deadwood in forests, which will have positive impacts on biodiversity. Reishi cultivation would also create an added value of leaving retention trees, which is a common conservation measure for enhancing biodiversity in boreal and temperate forests.

## 5. Developing nature-based tourism in North Karelia

### 5.1. North Karelia as a nature-based tourism destination

North Karelia is the easternmost region in Finland. Of its total land area, 89 percent is covered by forests (Regional Council of North Karelia 2019). The characteristics of the region lie also on hills and waterbodies, as there are over 2,000 lakes in the region. North Karelia has four national parks, Koli, Petkeljärvi, Patvinsuo and Kolovesi, and a popular Ruunaa hiking and fishing area. Parts of North Karelia belong to the North Karelian Biosphere Reserve promoting sustainable development (UNESCO 2019). The natural resources of the region offer versatile possibilities for outdoor activities and enjoying the nature, silence, and during the winter months, darkness. In addition, North Karelian hospitality and traditional cuisine are well-known and attract visitors to the region. The strengths of North Karelia link to the megatrends in tourism (*e.g.*, Haukeland *et al.* 2021), including demand for unique nature, safety and cleanliness that create several opportunities for tourism service development and bring competitive advantages for the destination.

In North Karelia, and in Finland in general, the land-owner structure influences a lot to diverse NBT activities. The state and municipalities are important landowners and responsible for most of the recreational and protected areas, including infrastructure for tourism and outdoor recreation (Fredman & Tyrväinen 2010). Hence, the NBT involves a greater number of stakeholders compared to some other forms of tourism. The Finnish NBT sector is also characterised by the rights to public access (everyman's right) that act as an enabler for recreation in nature for individuals. However, these do not allow commercial use of nature, and thus NBT providers need to have agreements with the private landowners for utilizing their areas for business activities.

The development strategy of North Karelia 2040 emphasises that the region should utilise the possibilities of NBT more than is currently done (Regional Council of North Karelia 2020). Moreover, the short-term development plans (North Karelia's Regional Strategic Programme for 2018–2021 by Regional Council of North Karelia 2018) highlight the possibilities of sustainable NBT, and the listed development objectives include supporting region's international competitiveness and product offering, enhancing marketing, and developing ecological and cultural tourism. The long-term plan also emphasises the creation of year-round business and tourism offerings based on nature and local culture (history and everyday life of locals) (Regional Council of North Karelia 2020). The development plans also underline the importance of all sustainability aspects in tourism development. Development of tourism services and events are seen beneficial for locals because they contribute to socio-cultural and economic sustainability (Regional Council of North Karelia 2020). The long-term strategy notes the importance of enhancing collaboration with Russia, but from the tourism marketing perspective and expanding international customer base, international marketing efforts to other regions are similarly important (Regional Council of North Karelia 2020). In addition, the inputs and goals to reach Asian markets are identifiable in diverse regional development projects (*e.g.*, developing the Arctic Blue Resort, <https://arcticblueresort.com/>), as well as regional destination management organisation's (DMO's) strategy, as they have an Asia Account Manager to advance the activities in these markets.

Most tourism companies operating in North Karelia can be counted as NBT companies, as they base their offerings on nature one way or another. For example, the website of Visit Karelia, the regional destination management organisation, lists over 40 companies offering nature-based activities for tourists (Visit Karelia 2021a). The listed companies provide activity services and rent equipment for NBT activities. Moreover, Visit Karelia lists over 60 accommodation service providers, including campsites, hotels, and hostels that utilise the natural surroundings. Thematically, nature, local life, and culture are at the heart of tourism offerings of the companies, and for instance, local and traditional cuisine is highlighted in culinary services (e.g., traditional Karelian pastries).

Most travellers come to North Karelia explicitly to enjoy nature, and thus, a great share of activities offered in the region relate to natural environment (Jones 2020, Wallius *et al.* 2020). These nature-based tourism activities include diverse guided tours related, for instance, to hiking, fishing, paddling, wildlife watching, and survival in the nature. Examples of activities offered are mountain biking tours, ice-fishing and ice-swimming, guided snowshoe hikes, and animal-assisted activities including dog sled safaris and horse riding in the nature (Doerz 2021). In addition to diverse activities, several nature-based service packages and tours are offered. The package tours are provided in collaboration of diverse local businesses, and the themes of the tours differ depending on the season. The winter activities include snowshoeing, cross-country skiing, and dog sled tours. Fishing, hiking, biking, canoeing, and rafting are offered during the summer. One of the most popular and well-known tours in the region are called 'From guesthouse to guesthouse' and they are available during both winter and summer. In addition to the natural settings and outdoor activities, the local cuisine is an important part of these trips, and to emphasis this the 'From guesthouse to guesthouse' tour has also won the national Hungry for Finland award for the best culinary tourism product in Finland in 2015 (Business Finland 2021a). Some of the tours also focus on wellbeing aspects by combining nature, local food, sauna, and wellbeing services (Äksyt Ämmät 2021).

While COVID-19 pandemic has strongly decreased international travel, it has also brought new business opportunities for local companies. For example, working remotely has raised interest, and companies in the region have been quick in offering packages directed to remote workers. Visit Karelia's website presents in total 14 companies offering these packages (Visit Karelia 2021b).

The demand for nature-based tourism services and activities was identified and supported also by the interviews among the tourism entrepreneurs in the region. They pointed out that their customers coming in North Karelia seek silence, relaxation, and connectivity with the nature. These themes are important also to Chinese consumers since, according to previous studies, they value clean nature, quiet environment, possibilities to relax and recharge, and the opportunities to get to know the local culture and history (Cai *et al.* 2001, Kim *et al.* 2005, Keating & Kriz 2008, Zhang & Peng 2014, Dichter *et al.* 2018).

## **5.2. Tourism companies' development plans related to offerings and target markets**

North Karelian companies aim at offering authentic, thematic and high-quality NBT products, providing unique experiences that utilise the Finnish nature in a sustainable way. Most of the interviewed NBT companies had some kinds of development plans for the near future (approximately five-year time span). On the other hand, most of these companies were lacking long-

term (10 years or more) development plans and strategies even though it was acknowledged that such long-term plans would be beneficial for the SME's.

Typical development plans were linked to growth opportunities. However, the firms had different strategies how to target the growth. The most common ways were the activities that can help to lengthen the travel season and create year-round business. Summer was indicated as the most important travel season. Spring and autumn, on the other hand, are clearly underutilised and, hence, require rethinking of the offering, operations and sales for these seasons. Moreover, increasing the capacity within season (*i.e.*, increasing the number of rooms for accommodation service providers) was planned by many companies. Some companies mentioned that they hope to develop new products, service packages or tours either by themselves or in co-operation with other local companies. A few companies mentioned that their goal is to increase the share of foreign customers, and some of them already had a detailed action plan for the post COVID-19 time.

Many of the interviewed companies emphasised that sustainability (especially ecological and social dimensions of sustainability) is an integral part of their company values and operations. These values and operations are put into practice by favouring locally produced food, materials and products, co-operating with other local companies, saving natural resources, and recycling carefully. Providing the customers with sustainability knowledge is also important for some of the interviewed companies. The companies were familiar with sustainability certifications (*e.g.*, Sustainable Travel Finland) – some of them already had the certificate and some were planning to apply for one, while others did not find it relevant for their business and customers. For instance, one of the interviewees stated that they did not see the added value of the certificate for their business, because their activities are built on sustainability principles, and they are collaborating with companies and tour operators sharing the same values. They considered that the certification process would be an additional cost and would take time from other activities.

Even though companies have development plans and wishes to grow, they explicitly want to do that following the principles of sustainable development. Companies aim to take environmental aspects, *e.g.*, energy efficiency and cutting emissions, into consideration in future investments. On the other hand, changing from, for example, oil heating to a more environmentally friendly option was seen difficult and expensive, and thus not a viable option to some companies. Some companies aim to enhance sustainability by developing new products with smaller carbon footprint, utilizing increasingly the products and services of their local companies and enhancing local collaboration. One company was interested in calculating carbon footprints of their products and providing carbon footprint information to their customers. Together with highlighting environmental sustainability, companies also see that it is important to take, *e.g.*, accessibility (as a part of social sustainability) into account when developing their products and services. This includes purchasing the product or service, but also accessing the location easily, preferably with public transportation.

Most of the interviewed companies pointed out that domestic customers are the main target group for them. Nevertheless, there are interests to increase the share of international visitors. The German-speaking Central Europe is by far the biggest international target market for most North Karelian NBT companies. In addition, Russian tourists are important to many companies due to the close proximity of the country. There are also growing interest to Asian markets, and the companies mentioned South Korea and Japan as attractive target markets. However, the interest in Chinese market was relatively low among the interviewees.



The interviewed companies regarded the Chinese tourists mainly as mass tourists. The companies are small and thus unable and unwilling to meet the needs of mass tourism. They hope to offer tourism products with longer stays, not only facilitating short visits, and feel that their supply and the needs of Chinese tourists do not necessarily meet. Moreover, cultural differences and language barriers were seen as challenges by the companies. On the other hand, it was mentioned that new technologies such as real-time online translation applications could be utilised to overcome the language barrier. Some of the NBT companies felt that there might be challenges to provide activities for Chinese that do not necessarily have connection with nature. However, most companies did not have any challenging first-hand experiences with Chinese customers. Some interviewees stated that they had participated in previous tourism development projects with a China focus and hosted small test groups, but apart from those, the level of experience with Chinese customers was low. In general, North Karelian NBT companies feel that Chinese consumers value aesthetics, art, and fast-paced activities and that they also can be interested in experiencing silence, darkness, and nature – especially in Finnish forests.

It was noted that if smaller niche market, namely Chinese tourists interested in nature and sustainability issues, could be identified and reached, the NBT companies would be interested in facilitating small Chinese groups or individual travellers. These groups could also include forestry professionals or students, since hosting, *e.g.*, benchmarking trips has raised interest in companies. However, reaching these smaller, specified target groups can be difficult and requires connections as well as knowledge of the market. Companies feel that they would need support with establishing connections to China, finding the right customers, and marketing their products and services to the right customer segments. Co-operation between North Karelian NBT companies and destination management organisations could be further enhanced and utilised in marketing towards China.

### **5.3. Tourism firms' perspectives on issues influencing the development possibilities and interests**

Multiple drivers and barriers for development were identified from the interviews. Global issues affecting development possibilities included current COVID-19 situation, climate change, and tourism megatrends. COVID-19 situation caused severe financial and other insecurities in some companies. They were worried about the survival of their own companies but also the viability of the local business network enabling co-operation. On the other hand, others have benefited from the situation as the grown interest towards hiking and camping has drastically increased the number of domestic customers, even though overseas travel has practically stopped. Climate change and warming winters in Finland were mentioned as big challenges for the NBT companies and activities. Nearly all winter activities offered in North Karelia require a certain amount of snow, and the trend of snow level has been decreasing (*e.g.*, Pulliainen *et al.* 2020). Tourism megatrends, including increased interest in sustainability and nature-based activities, were mainly seen beneficial for North Karelian NBT companies and create opportunities for growth.

On national level, the use of state-owned forests in NBT activities influences many NBT companies' operating environments. Many nature-based tourism companies feel that intensive forestry is one of the central barriers to their operations and development activities. To be precise, clear-cuts and other radical changes in scenery were mentioned as important challenges by multiple company representatives. Even though the Finnish government owns large forest

areas in North Karelia, companies feel that dialogue with Metsähallitus (administering the state-owned land) is sometimes inadequate due to the lack of personal connections or limited resources, mainly in terms of time and effort, that would be required to communicate with public institutions and affect their decision-making. Many NBT companies feel that their possibilities to influence decisions made by public enterprises and authorities are small. Continuous-cover silviculture could be a solution if it was to become a more common method in state-owned forests. Moreover, the financial and other resources that Metsähallitus assigns to North Karelia explicitly affects the maintenance of existing routes, official fireplaces, and wilderness huts, and developing and building new ones. Thus, companies feel that increasing dialogue with Metsähallitus as well as the regional government would be needed. This could be achieved by, *e.g.*, assigning a person from these organisations to be responsible for collaboration with local stakeholders and to support dialogue between different actors.

For companies operating in or near national parks, strict regulations that *e.g.*, forbid mountain biking in national parks can create barriers. In terms of drivers, companies feel that national tourism trends support the development of North Karelian NBT. Travelling within Finland and visiting national parks has been a rising trend in the recent years (Konu *et al.* 2021) and created opportunities and growth for many companies.

On local level, issues faced by NBT companies include difficulties in the physical operating environment. Typically, these are the results of one-sided decision-making and difficulties in or lack of co-operation between actors. Fragmented forest ownership is posing challenges to discussions in terms of forest management practices and routes available for NBT companies. Over a longer route, there can be over 100 individual forest owners, with whom agreements need to be done separately. In case of unsuccessful discussions with an individual forest owner, it is possible that the whole route needs to be lined differently. Some companies state that there is a lack of real co-operation and active, open communication between different companies, actors and smaller regions within North Karelia. On the other hand, companies also name the existing networks and collaborations as drivers for development. For instance, one company acted as destination marketing company (DMC) that also has an online shop for regional tourism products. Many companies state that they have benefited from having other companies with similar visions and strategies in the region. It has enabled joint products, co-operation and peer support, and branding of the region. However, interviewees also highlighted that there is still room for further collaboration also between diverse industries. This included, *e.g.*, a distribution network of local food products which could help tourism businesses to have a better access to the products and save time themselves. Some companies state that the role of Visit Karelia, the destination management organisation (DMO) of North Karelia, has been important in creating collaboration and networks. Moreover, it has been active in marketing the region nationally and internationally and raising visibility, as well as participating in or leading projects and trainings. On the other hand, others state that the communication between different actors could be more active and more work is needed in the branding the region. Visit Karelia could help in marketing and sales, creating new online sales platforms, as well as finding the right niche markets for North Karelian NBT companies.

*Internal factors* affecting development possibilities include especially company's resources. The companies are typically micro or small (family businesses or only a small number of seasonal employees) and the resources such as time and financial capacity are rather limited. Some interviewees mentioned that they could focus more on the economical sustainability, but they don't want to do that if it means they should compromise with other sustainability aspects. However, the lack of financial resources limits the possibilities to make sustainable investments.

One company mentioned that they had a crowdfunding initiative, showing that innovative measures have been taken to support the economical sustainability. Related to the continuity of the business activity in future it was pointed out that for small family-owned companies, finding a successor after retirement can be difficult. Additionally, finding suitable, skilled workforce to remote locations was identified as a challenge to some companies. Moreover, personal wellbeing and difficulties in it, enhanced by COVID-19, were brought up by some entrepreneurs.

The interviews show that the most of the interviewed company representatives have sustainable values guiding their business activities. Some of the interviewed companies already had some kind of sustainability certificate and they were constantly thinking also future developments enhances their responsibility activities. However, there were also a few businesses that did not yet fully understand the sustainability perspectives and how to link them better to their activities. Communication, marketing and sales was one central issue that was pointed out. In order to incorporate strategic responsibility as an integral part of NBT companies and their activities and products, training and incentives should be targeted to companies.

The competitive advantage for the North Karelian NBT sector relies on the clean, beautiful and versatile nature. Hence the maintenance of these resources is central for the tourism business activities dependent on them. The tourism sector can support this by developing and offering products and services that support the sustainable use of the resources while offering memorable and even transformative nature experiences. The negative tourism impact can be decreased, for instance, by promoting trips that increase the length of stay in the region, support the usage of local services and engagement of the local community. This can be reached for instance by developing collaborative and thematic products that offer activities for a longer period of time. Currently, as noted in the next section, there are already very good examples of this kinds of services in the region, but the interview findings pointed out that there is still room for wider collaboration in the whole North Karelia region.

As nature is at the core of NBT activities, tourism sector could also participate in keeping the destination appealing together with other industries as well as regional actors. The region could benefit from a local ecological compensation model taking different ecosystem services into account. This means that for example carbon offset projects could be carried out in North Karelia by local actors.

#### **5.4. Development ideas for thematic nature-based tourism products**

Based on the company interviews, future travel trends and weak signals (*e.g.*, Business Finland 2021b), and the workshop with future studies experts, ideas for new, thematic nature-based tourism offerings were mapped. The aim is to draft new sustainable product and service ideas and themes that utilise the unique characteristics of the region and link to the current and arising consumer needs. Different development themes were identified, namely wellbeing and mindfulness from nature, new luxury, cultural connections, nature-focused education, and virtual tourism services (Fig. 6). These themes are further elaborated below.

*Wellbeing and mindfulness through nature experiences.* The health and wellbeing aspects of nature has been widely identified (*e.g.*, Lee *et al.*, 2009; Tyrväinen *et al.*, 2018) and the importance of nature as a source of wellbeing has been recognised and the demand for nature-

based wellbeing services has increased especially during the COVID-19 pandemic. Integrating the wellbeing effects of nature into nature-based tourism offerings could bring competitive advantage for tourism services and open new possibilities in the market. The health and wellbeing benefits can be connected in diverse levels and for some services they can be the core of the experience and for others they may complement other experiences. Nevertheless, for some target groups it is important to communicate the wellbeing benefits for the customers. Some of the services should be designed in a way that they can trigger transformations in customers, who then may change, based on the experience, their everyday practices, *e.g.*, to support their wellbeing. This can mean, *e.g.*, learning new practices or skills that can be adopted into everyday life, for instance, starting to utilise seasonal wild edibles in diet, practice a new wellbeing enhancing activity or increasing participation in outdoor activities in general. Local traditions and sources of wellbeing can be integrated into wellbeing products, an example being the traditional sauna experience (see also Chapter 6).

*Experiences of new luxury.* The concept of “new luxury” refers to sustainable, high-quality, detailed and holistic tourism products and services that are unique and personalised and enable self-improvement, new experiences and relaxation (Adamsson & Iloranta 2019, Iloranta 2021). New luxury is less focused on material and more on immaterial values such as wellbeing, and it means more and more authentic experiences that take people back to nature (Skift 2017). New luxury is also more accessible to middle-class travellers and thus creates potential for growth. North Karelia and Lakeland area have a great potential to provide these kinds of services by offering new luxury products and experiences utilizing the lake environments. In the region, it is still possible to experience silence and darkness, which is regarded luxurious in the world where the places without noise and light pollution become rarer. As North Karelia is not a mass tourism destination, it can offer exclusive experiences in remote settings that can be regarded experiential especially for many foreign travellers.

*Cultural connections.* Natural linkages to culture, history and, *e.g.*, geology could be emphasised even more in nature-based tourism. Tourism experiences that provide true cultural connection for travellers and enable them to have immersive experiences linked to the local culture and way of life is becoming more popular. This links, for instance, to creative tourism which refers to the active and multisensory involvement of the traveller and can include, *e.g.*, cultural workshops and classes lead by locals (Business Finland 2021a). For example, the traditional Finnish relationship with nature, natural beliefs from the ancient religion, and practices related to foraging and hunting could be more strongly integrated in NBT products and services. Collecting and using berries, mushrooms and other wild edibles could be integrated as a part of NBT products and packages more efficiently, creating unique experiences that also utilise the local culture and cuisine.

*Nature-focused educational and professional visits.* North Karelia as a region is well equipped to offer educational tours for school-age children, students, and professionals with a new twist. Sharing forest and nature-related knowhow and best practices could offer new business opportunities for NBT companies. The North Karelian know-how about innovative and multi-storey wooden construction has enhanced the potential for professional or benchmarking trips. Already the existing wood construction projects in North Karelia, such as the Metla house office building and the 14-floor student apartment building Lighthouse being the tallest wooden building in Finland (Puuinfo 2020), have attracted many professional visitors. Moreover, targeted products with educational elements could be created and marketed to families with children as well as groups of high-school, vocational school and university students.

*Virtual nature tourism services.* Virtual tourism means visiting a destination without physically travelling. The COVID-19 pandemic and subsequent travel restrictions have caused an increase in new innovations and consumer interest in virtual tourism (Hukkanen 2020). Emerging and advanced digital solutions, *e.g.*, virtual reality and augmented reality technologies, can be utilised to create new, sustainable products that provide complementary supply for tourism firms. With these new innovations and applications, travellers can visit, *e.g.*, attractions and museums from their own couch, without crowds and queuing. For example, after the COVID-19 outburst, virtual experiences of the Finnish Lake District were developed to Japanese customers by utilizing 360° or VR videos and photos with an interactive component (SaimaaLife 2020). Virtual products can also be combined with physical commodities sent to the customer, creating joint possibilities for the tourism sector and product-based sectors. For example, a virtual NBT product could be bought together with a selection of non-wood forest products as a single high-quality product by sending complementary products beforehand to the customers to be consumed during the virtual experience. Local tourism companies could also work together, offering joint virtual products and a subscription opportunity – with a certain price a customer could access all the virtual tourism products in the region for a certain period of time. This way, companies could share costs as well as revenues. Virtual educational trips for, *e.g.*, school-aged children could be another innovative tourism product creating opportunities for reaching a larger audience. Moreover, virtual travelling may act as “teaser” experiences to attract people to travel to the destination also physically.

Especially experienced Asian travellers are looking for individual choices and customised tourism products. Moreover, mono-destination travel, *i.e.*, staying in one destination rather than touring many, is expected to increase within this Asian customer segment (Business Finland 2021c). This enables developing service offerings for longer stays which also have sustainability benefits. The recognised travel signals of East Asia market for the near future include safety and hygiene which is especially important due to the COVID-19 pandemic. Additionally, people are travelling in smaller or private groups, *e.g.*, together with the family. Also, the number of free independent travellers will increase. The interest towards nature, nature attractions and ecotours is rising. However, this means that more guided and packaged services will be needed to provide services also for those travellers who are not so experienced visiting nature.

Digital solutions and technology play important part in tourism service provision. COVID-19 pandemic has increased the demand for no contact services for safety reasons. Asian tourists also expect that technologies and solutions such as AR (augmented reality) and AI (artificial intelligence) are integrated to tourism activities on-site but also to the marketing of the destination; travellers are looking for smart destinations, new payment methods, and social e-commerce (Business Finland 2021c).



**Figure 6.** Themes for experiential tourism products in North Karelia (Photos: Henna Konu).

## 6. Added value from combining the bioeconomy sectors: case sauna

Innovative intersectoral cooperation and cross-disciplinary development are needed to develop the bioeconomy in North Karelia. There are growing possibilities to intensify collaboration between tourism service providers and social and health care sectors to provide new nature-based wellbeing services. While the use of natural resources is characterised by contradictions between resource-intensive industries, an open dialogue and brainstorming is needed to identify feasible solutions and jointly beneficial business models. For example, the currently scarce co-operation between tourism and forest industries could be developed via new types of wood construction solutions for travel destinations or utilisation of wood construction as a tourist attraction.

One possibility to create new business and co-operation between bioeconomy sectors is the traditional Finnish sauna experience. Sauna as a future opportunity was highlighted by several Chinese interviewees from the wood products sector. Sauna is nowadays a wanted and well-known brand in China, which, according to the interviewed experts, could become something similar to the Moomin characters in Japan. Chinese people associate sauna with Finland and consider going to sauna as a fascinating and health-promoting act. Sauna should be marketed by promoting its proven medicinal and wellbeing effects, such as cardiovascular benefits and protection against dementia (Laukkanen & Kunutsor 2019, Knekt *et al.* 2020).

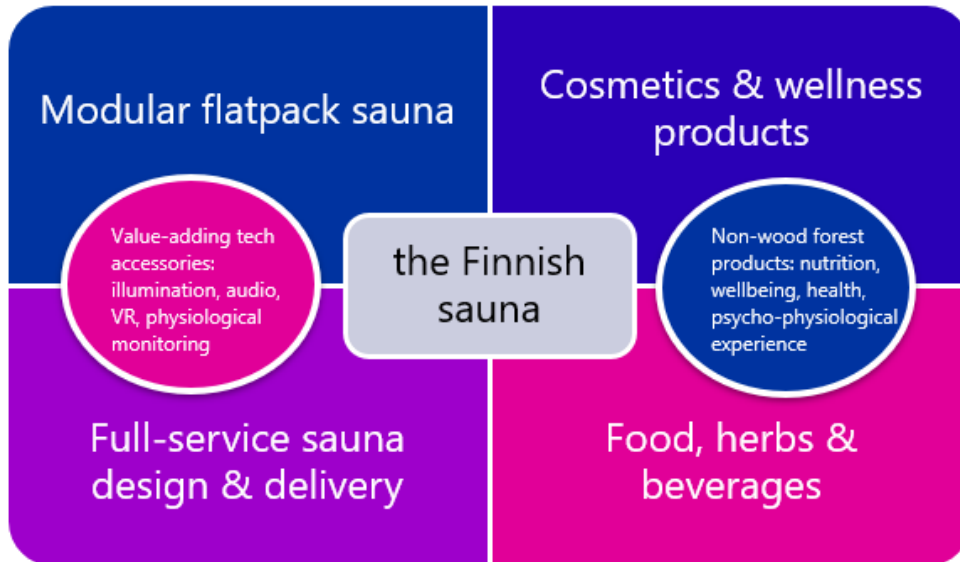
The greatest sauna market potential lies in the millions of existing apartment houses in China. Middle class people would like to have a post-installed sauna module that can fit in the two square meter bathroom, thus enabling something we call *working day wellness*: enjoying the restorative effects of sauna and related goods at home and as often as wanted. Production and export of prefabricated sauna modules from North Karelia would create considerable business potential for the wood product industries, as well as cosmetics, beverages and many other supplementary goods. The sauna modules should be smartly designed and packed in easily transportable flatpack. Flatpack is mandatory not only to minimise the overseas logistics costs but also to enable moving the sauna package from the retailer to the customer, as well as inside the customer's apartment that is most typically located in a multi-storey building only accessible by elevator and regular doors.

Besides apartment houses, another considerable sauna market is in the large holiday resorts, also driven by the wellness boom in China. Companies could also focus on creating and exporting luxurious design saunas that are customizable and unique, responding to the needs of high-end and professional customers.

All sizes and price categories of saunas between these two extremes have certain market demand. According to the information received from the respondents, German and Swedish companies are rather actively selling saunas (and related items) in China, while only one Finnish company is present in the markets. The global sauna market is expected to grow at an annual rate of five per cent, hence there is no need to develop a sauna brand based solely on the Chinese market. Especially North America and the rest of Asia are raising interest in the market.

We believe that one future value chain that combines elements from different bioeconomy sectors could be built around Finnish sauna concept. According to Sauna from Finland (saunafromfinland.fi) "sauna" was the most searched travel-related word from Finland in 2020, over-riding words such as "Northern Lights", "Tourism", "Places to visit", "Lakes", or "Santa Clause".

The region of North Karelia could be branded as a global sauna hub. Sauna-related products and services could be marketed to consumers searching a traditional but unique experience. Sauna experience combines elements from several bioeconomy sectors: wood products, non-wood forest products, and nature-based tourism and thus create added value and more jobs for all sectors (Fig. 9).



**Figure 9.** A broad offering that combines wood, non-wood forest products, tourism, and North Karelian knowledge in photonics, gamification, etc. could be built around the Finnish sauna brand. Model for the sauna design & delivery shop could be adopted from modern kitchen delivery process.

In addition to the product and service export potential, several North Karelian tourism companies already offer some sauna related NBT products (see *e.g.*, <https://aksytammat.fi/wellness/saunat>). However, they could be further developed and marketed. Sauna bathing should be a holistic, multisensory experience, with carefully designed lighting, acoustics and scents. Different types of Finnish saunas (*e.g.*, peat sauna, smoke sauna, floating sauna rafts) could be combined into multi-day sauna holiday and Lakeland adventure. To complement the offering, sauna-related products utilizing NWFPs could include, *e.g.*, soaps, shampoos, bath whisks, cosmetics, drinks, and other wellness products. Another natural link to sauna is food and the traditional North Karelian cuisine – a holistic sauna experience should be completed by traditional high-quality meal made of local ingredients and beverages.

Sauna concept could also integrate and incubate RDI. The wellbeing and medicinal effects of sauna and related cosmetics and pharmaceuticals including NWFPs are already studied in North Karelia, but RDI should be broadened towards business economics in order to meet the needs of the customers and export-oriented companies. Exceptional design and engineering solutions must be applied to streamline the production and logistics systems in a way that enables smooth and cost-efficient long-distance, as well as local and in-house transportation and installation of the sauna modules. The sauna concept has apparent potential to turn into a triple-helix regional innovation hub, in which the business is based on academic research, interregional collaboration, as well as governmental and regional support. While considering the Chinese markets, it is important to highlight that business built on sauna concept is quite safe in terms of IPR and copying issues, since sauna is such a strong Finnish brand.

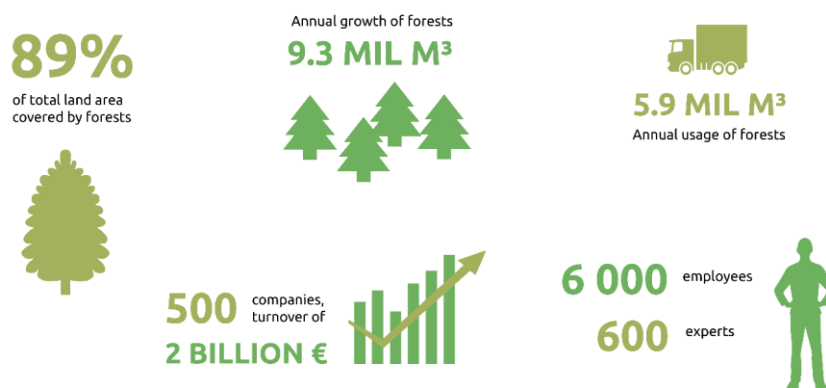


## 7. Future scenarios and their implications in North Karelia

The North Karelian forest-based sector is a key enabler for regional transition to a more sustainable and circular forest-based bioeconomy. The forest-based sector in North Karelia is a cornerstone of rural economic development and a major employer (Fig. 10).

There are considerable opportunities for green development in the future. Although some collaboration with China has taken place during the last decades, its scale has been relatively small. There are opportunities, which could benefit a transition to a more green and sustainable future in both the region of North Karelia and China (Wallius *et al.* 2020). In this chapter we analyse how companies and experts in three sub-sectors of forest based-bioeconomy evaluate the current collaboration between North-Karelia and China, its mid-term development trends, and their impacts in North Karelia.

### *Forest resources and world-class expertise*



**Figure 10.** North Karelian bioeconomy in a nutshell. Source: The Regional Council of North Karelia (2021).

Scenario analysis is one method to assess the future development of bioeconomy co-operation between North Karelia and China. The results of expert interviews on opportunities, challenges, new products, and business models allows preparing scenario analysis that serves as a tool to understand and to outline the alternative future developments. This study builds and analyses two alternative scenarios, the *desirable* and the *undesirable*. These can be interpreted to provide boundaries for the optimistic and pessimistic future paths for the sub-sectors and North Karelian bioeconomy in general. The actual path of development is most probably somewhere between these two extremes. Behind the two scenarios are many assumptions of the operational environment consisting of political, technological, environmental, and societal change drivers. Table 2 summarises these background assumptions. It is noteworthy that many of these assumptions cannot be directly influenced by national decision-making, but come from and are transmitted, for example, by EU legislation, international markets, or changing consumer preferences.

In case of the ***desirable scenario***, the region's wood products sector will remain vibrant, developing new business models that will produce high value-added products and revenue with

a lower consumption of raw materials. With regards to the sauna concept (see: Chapter 6), a production of different types of transportable sauna modules has emerged serve the needs of various customer segments in export markets. The sauna concept involves and employs an extensive business network from further processing of the basic wood products (*e.g.*, sawn-wood, construction logs, panels, moldings) to modern design, engineering, audio-visual experiencing such as virtual nature, illumination and audio, health related self-diagnostics services, sauna-based tourism, cuisine, refreshments, cosmetics, logistics, and brand management.

The nature-based tourism and NBT companies in North Karelia are flourishing. The companies are working in close co-operation with each other, as well as the regional destination management organisation, to create joint products, services, and added value. The visitors stay in the region longer periods of time, thus creating higher mean regional revenue per visitor. NBT business will be year-round instead of short seasons during the winter and the summer. Moreover, the dialogue with stakeholders with possibly contradicting land use interests, such as public and private forest owners, forestry actors, forest industries, renewable energy production, nature conservation, and local bioeconomy SME's is active and effective. Cross-sectoral business opportunities have been identified, branded, and utilised in service design. For example, sauna tourism is of increasing interest, and non-wood forest products are strongly integrated into NBT products and services.

Sustainable ways of transport, including high-speed train connections, are in place, and North Karelia is easily accessible. Local strengths have been identified and they are strongly utilised in NBT products creating unique and new luxury experiences drawing from the nature. These local strengths include, for example, the Karelian cuisine and hospitality, silence, peace, and seasonal specialities, such as darkness and snow. Tourism sector supports the maintenance of their operational environment, *i.e.*, nature, and sustainability is integrated in all NBT activities throughout the value chain. Customers also understand and value these efforts. With regard to Chinese visitors, the available niche markets have been identified and reached. These include Chinese travellers interested in, *e.g.*, regenerative travel, sustainability, mindfulness and learning new nature-related skills such as surviving in the nature. Bioeconomy driven educational and professional visits with different age and target groups (*e.g.*, elementary school pupils, forestry students and young professionals, as well as wood construction professionals) are frequent.

**Table 2.** Desirable and undesirable scenarios for North Karelia’s forest-based bioeconomy and their relevant change forces.

	Desirable scenario	Undesirable scenario
Political factors	Bilateral economic cooperation between China and Finland is further strengthened. Local policies support local markets, entrepreneurship, and local networking. Services and incentives for unsustainable business practices have stopped. Strategic sustainability and aim for net positive effects are important.	International treaties (e.g., Paris Agreement) are not followed. Protectionism increases. Crossing national borders becomes more difficult.
Economic factors	Economies are growing in potential export markets. Increased market demand for Finnish wood and NWFP’s. Public procurement policies support building with wood and purchasing long lifecycle wood products. Improved trans-Eurasia logistics through express trains facilitate trade between Finland and China.	Financial insecurity increases. International tourism does not recover. Branding and marketing of Finnish product and NBT services fails. The utilisation of forests is under contradicting pressures.
Societal and social factors	Local strengths are identified and utilised. Connection to nature is re-established in Finnish and Chinese lifestyles. De-centralisation of population seen due to Covid-19 (e.g., distant working) becomes a new normal. Culturally sustainable tourism is raising interest.	The opportunities to influence are small for small businesses. Equality is threatened. An increasing urban population is more and more estranged from nature and forest-based livelihoods.
Technology-related factors	Technology enables energy-efficient digital activities. New technologies (e.g., AR/VR) support virtual solutions in tourism. The environmental impacts of transportation are reduced due to technological advancements. Commercial breakthroughs in technologies based on wood fibre refining, including wood-based plastics and textiles. Timber engineering enables wider use of wood in high-rise and large buildings.	The development of low-emission transport is slow. Technology advancements related to, e.g., wood-based plastics, textiles, and wood construction lack behind.
Environmental factors	Relationship with nature defines human actions. Climate concerns favour domestic and local tourism Natural resources are utilised sustainably. A lifestyle based on unnecessary and un-sustainable consumption is halted.	Climate concerns have negative effects on NBT services offered all over Finland. Environment and natural resources are exploited unsustainably or unequally by limited stakeholder groups.
Value-related factors	Environmental awareness decreases consumption in general and consumption of single-use/short lifecycle goods in particular. Decreased dependency on fossil-based materials and fuels. “Remote work tourism” and longer stays are valued in tourism. Travelling by land becomes more popular.	Tourism is based on short stays at the destination, added value per visitor is low. Various sustainable nature values (silence, darkness) that are of interest for international tourists are not fully understood.

NWFP's are increasingly valued, especially for their health effects. In a good harvest year, the financial income from NWFP's exceeds the income from timber sales. Because of their social, economic and well-being benefits, the yields of NWFP's are assessed as a part of forest planning. Studies on the effects of different forest treatment options on mushroom and berry harvests are used in forest planning to ensure the yield of natural-grown berries and mushrooms. The research results are utilised in the planning of municipal and state forest management, especially in areas where mushrooms and berries are known to be picked. Active cultivation of berries and mushrooms is practiced by many forest owners. For many of them, cultivation is mainly a hobby but provides a considerable additional income. In addition, some professional companies have specialised in active berry and mushroom cultivation, offering various services to forest owners from establishing cultivations to final harvest and sales.

Companies active in collecting and buying NWFP's collaborate and have set up effective collector networks. There is also more co-operation in further processing of the NWFP's, and the companies have developed an attractive product portfolio. Companies have found their own product's niche. Organic certification generates added value for the products. Increased collaboration and well-organised producer networks boost export, and with the help from Chinese partners, a well-functioning distribution network has been set up.

New business models are developed to forest-owners to gain income from the forests by combining the multiple ways of forest use. The business models are developed with considering the potential use of forests related to nature-based service provision, cultivating, and collecting NWFP's, as well as using the wood material in a sustainable way. The combination of diverse activities is designed based on the characteristics of the forest, and there is expertise available for this kind of approach to support the forest owners in their activities and planning of the forest management.

In the **undesirable scenario**, many positive developments mentioned above and documented in Table 2 do not fully or partially realise. The reasons behind the undesirable scenario development can be manifold, such as changes in international and trade politics, new restrictive legislation for forest use, trade restrictions, inability to create local networks and collaboration between different industries in North Karelia, or lack of competence or skilled labour. In wood products sector, the undesirable scenario can be realised by general lack of demand for wood products, which, based on current understanding, is possible but rather unlikely to take place. In case of the sauna concept (see: Chapter 6), for example lack of proper industrial and RDI networks or ineffective marketing and branding may result in failure in meeting the various requirements of Chinese consumers. In the NWFP sector, the undesirable scenario can realise if companies do not innovate, for instance if companies continue producing many similar products and mainly compete in the same product niche.

Concerning region's NBT sector there can be multiple obstacles that cannot be overcome. The capacity is inadequate for the Chinese mass tourism markets, and suitable niche markets and new consumer segments have not been found and connected with. Financial and political insecurities and lack of collaboration hinder investments and development of small and medium-sized companies. Stays in the region are short and the income from Chinese visitations has not increased as expected. North Karelia is not easily accessible by public transport and sustainable transportation is underdeveloped.

The assessment of economic impacts of both desirable and undesirable scenarios on the future of North Karelia is complicated. According to Valonen *et al.* (2018), the wood products and furniture industries created 68 million euros value added in North Karelia in 2018.

Correspondingly, the wood products and furniture industries paid salaries approximately 47 million euros, and employed 13 percent, *i.e.*, 1,470 people, of the industrial employees in the region. The recent calculations by Berg-Andersson *et al.* (2021) show that a ten percent increase in final demand of wood products would lead to a 4.7 percent increase in wood industry's output and 2,100 new jobs in Finland.

In terms of the business lifecycle, most parts of the current wood products sector can be considered as mature businesses. Therefore, emerging product innovations are rare and new business potentials are typically related with systemic organisational or market driven transformations, such as a) new markets are found; b) existing market demand change as a result of, *e.g.*, updated normative guidance; c) consumer behaviour changes as a result of, *e.g.*, increased environmental awareness; d) organisational or business environment transformations that occur in availability or price of factors of production, industrial symbiosis, cascade use of materials, or value adding collaboration between two or more sectors. In case of premature or emerging businesses, such as NWFP value chains, product and service innovations are typically more common than the organisational ones.

The turnover of the NWFP sector is gradually increasing. In 2018, the total turnover of the natural product sector in Finland was estimated to be more than 300 million euros (Ristioja 2018). Growth comes both from domestic consumption and increasingly from exports. The share of processed products especially in exports has grown considerably but still covers no more than one third of the value of exports.

The increase in value in the bioeconomy sector is approximately one third during the last decade. Particularly in NBT and recreation sectors the value added increased from 1.3 billion euros in 2014 to 1.9 billion euros in 2019 (Koljonen *et al.* 2021).

Overall, when considering the desirable scenario and the three sub-sectors together, it is expected that China can have a stimulating impact on bioeconomy development in North Karelia, and this will have an overall positive impact for the region (Figure 11). For all three sub-sectors (wood products, NWFP, NBT), value added, turnover, employment, and the number of companies active in the sub-sectors will likely increase. For the wood and NWFP sectors, export of higher value-added products will most likely increase. For the NBT sector, the number of visitors from China, and especially the revenue per visitor, will most likely increase. The growth in visitor numbers will probably not consist of recreational mass tourism, instead North Karelia will increase its interest as a provider of forest education and forest related business traveling.

While the production processes are highly automated, the direct employment effects in wood products sector may remain rather low, thus, the employment coefficients presented by Valonen *et al.* (2018) and Berg-Andersson *et al.* (2021) cannot be directly applied. Also, the effects on forestry may remain low because the change in roundwood consumption volume is small: business development is based more on further processing and value added. Due to the networking cluster of different industries, some development steps, such as design, can be carried out outside of the region. Instead, the indirect effects in logistics, sales, and services may have higher relative increase. The total employment can increase by some hundreds of employees, while the turnover in wood product sector can increase as much as some hundreds of millions of euros.

Under the desirable scenario, the available NWFP raw material supply enables a realistic increase of 10–20 percent in turnover of the sector. Although there are no statistics on the number of people employed by the NWFP sector, the number of companies in North Karelia,

reported by Ristioja (2018), was 32 companies in 2018. Most of these were micro-enterprises with 1–10 employees. Considering a growth of 10–20 percent, approximately 16–32 additional full-time jobs could be generated. In addition, hundreds of additional part-time jobs would be created in collecting the raw material. NWFP's keep on being very important for private households, who collect them for their own use, as well as for commercial sales.

It is also noteworthy that the different forms of forest use can be combined in the positive scenario, hence, the needs of increasing NBT, for example, are not in conflict with the requirements of the wood processing sector. Developments in the three sectors do not harm but more likely support each other. Integrative approaches, such as the sauna concept (see Chapter 6), would benefit all forest-based bioeconomy stakeholders. An increased demand for wood or biomass would, however, possibly lead to more intensive forest management, which would, subsequently, cause trade-offs between wood production, NWFP's and NBT.

The undesirable scenario can be seen, more or less, as a “business as usual” development path in North Karelia, and production volumes, employment, turnovers and services in different bioeconomy sectors can be close to the current state and change only along with the changes in demand in prevailing business cycles. This means that companies still manufacture rather conventional products and mainly compete with each other in the same product niche and traditional markets. Forests are intensively managed mainly for wood production, whereas the NWFP's remain as an underutilised resource. Finland is an exporter of raw materials or primary-processed products, and only small share of NWFP's is processed into higher added value products. All across the globe, urbanisation has estranged people from nature, and companies have not been able to market Finnish NWFP's as a source of environmentally friendly, nutritious, and healthy food or medicinal products.

It must be noted that even though China has been investing a lot in bioeconomy development over the last years, it is likely that in the near future this high rate of investment will not continue. China has become more cautious in making new investments (Kallio *et al.* 2020). However, research and development collaboration between China and Europe has increased in recent years and these efforts aimed at creating novel technologies and know-how have the potential to result in substantial benefits to both regions. Nevertheless, to develop a forest-based bioeconomy in North Karelia requires rather large investments, but most small and medium sized North Karelian companies do not have the financial resources to make the necessary investments. Therefore, it is important that the companies work together towards organisational innovations, such as producer and service provider networks. Policies and research can also play an important role in advancing the bioeconomy development. Close cooperation between companies, research organisations, and policy can strengthen the exchange of knowledge and know-how, and lead to a better uptake of research results into practice, which, in turn, will stimulate the development of innovations.



**Figure 11.** Sub-sectoral developments in the preferred scenario and its expected impacts in the region of North Karelia

## 8. The way forward

This study mapped pathways to increase forest-based bioeconomy co-operation between North Karelia and China. Three bioeconomy sectors were analysed: wood products, non-wood forest products (NWFP's), and nature-based tourism (NBT). The analysis is based on interviews of representatives of Finnish and Chinese companies as well as experts of the three sectors, supplemented by internet-questionnaires and participatory workshops. The results indicate that there are untapped potentials and possibilities for the North Karelian forest-based bioeconomy to grow with increasing co-operation and due to constantly increasing demand for bioeconomy products and services in China. Moreover, new products and value networks can be developed to meet the needs of Chinese visitors, consumers, and business collaborators. For wood products, the new possibilities include increasing the production and export of further processed North Karelian wood and composite products. For NWFP's, apparent export potentials were identified in North Karelian chaga and reishi mushroom products, and further processed goods, in particular. In terms of NBT sector, Chinese niche markets were identified in sustainable, unique nature-based tourism services relying on clean, quiet and healthy North Karelian environment.

North Karelian companies should obviously re-organise and tighten their internal networks and enhance co-operation by integrating different sectors to meet the demand, to develop new products and services, and to carry out joint marketing efforts. Professional tourism and educational summer camps that integrate elements from NWFP's and wood products sector with NBT could be an interesting approach in North Karelia. Finnish sauna, with increasing market in China, was identified as a brand that could be further developed in North Karelia, innovatively combining the needs and opportunities of all three sub-sectors studied. At its best, growing businesses would bring hundreds of new jobs and hundreds of millions of turnover and value added in North Karelia.

Moreover, there are barriers that need to be overcome in order to develop the bioeconomy collaboration between North Karelia and China. Typically, Finnish companies are small and production volumes low in relation to the Chinese demand potential. Their products could be especially suitable to niche markets, but identifying these markets, creating and fostering the mandatory contacts, and finally establishing viable business requires long-term and systematic work, which is often too demanding or expensive of an investment for the small and medium-sized companies. Having a better understanding of the Chinese business culture would be beneficial for the Finnish companies. Regional production and marketing networks would be beneficial in reaching the Chinese target markets.

The region of North Karelia has a huge capacity in terms of forest-based circular bioeconomy research and expertise. By systematic branding and development work, North Karelia has a realistic chance to become the knowledge hub for businesses and academia related to forest-based bioeconomy. Sustainable timber construction, non-wood forest products, and sustainable tourism education represent sectors with high potential already now. This could attract students and businesses from all over the world, including China, to North Karelia. Enhanced research and education collaboration could trigger and support market co-operation. Even though there will be significant economic and employment benefits, exporting more (wood and non-wood) products or attracting more tourists doesn't necessarily improve the sustainability of the forest-based sector. On the contrary, it could have very adverse impacts on the environment. However, our analysis shows that the negative trade-offs are limited as producing more high value-added wood products would not increase the total use of wood or lead to



more intensive forest management. Cultivation of non-wood forest products can be combined with sustainable and ecological forest management. If nature-based tourism increases people's environmental awareness, open-mindedness, interest in other cultures, and people start changing their lifestyle in a more environmentally friendly and culturally sustainable way and tell others about it, it could have a huge positive impact. Similarly, students and businesses attracted by North Karelia as a bioeconomy knowledge hub will take their knowledge home and some of them will apply this knowledge in their professional life working on sustainable solutions in all kinds of fields. In addition, students or professionals may renew the contacts they made during their visit in North Karelia and seek for collaborative projects between Finland and China, or any other country across the globe. One way or another, most countries face similar environmental issues and countries can learn a lot from each other by knowledge sharing on sustainable solutions. In this way, the North Karelian Forest-Based Circular Bioeconomy Knowledge Hub could improve the sustainability of the forest-based sector all across the globe. From (Regional) Knowledge to (Global) Action.

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