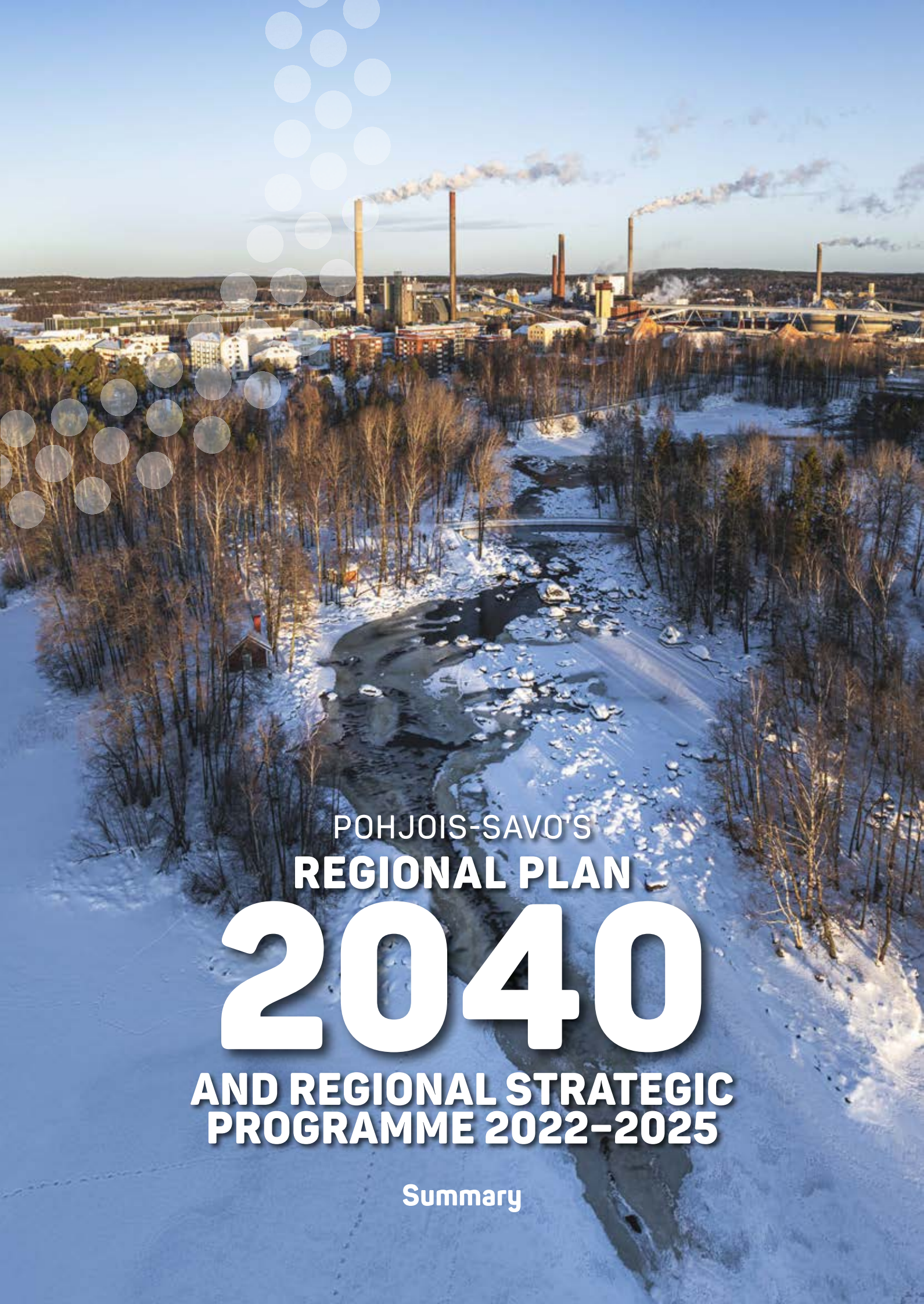

POHJOIS-SAVO'S

REGIONAL PLAN 2040

AND REGIONAL STRATEGIC PROGRAMME 2022–2025

Summary

Total population

248 300

Largest towns

Kuopio	120 200
Siilinjärvi	21 300
Iisalmi	21 100
Varkaus	20 300

COVER PHOTO:

Stora Enso's Varkaus Mill is self-sufficient in energy. Combined heat and power plants use 95 % bio- and recycled fuels. Finnish technology company Finnforel also operates in the same factory area. It has become one of the world's leading ecological fish farms. A bypass for endangered migratory fish will be built in Ämmäkoski in 2022.

POHJOIS-SAVO'S REGIONAL PLAN 2040 AND REGIONAL STRATEGIC PROGRAMME 2022–2025

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REGIONAL COUNCIL 15.11.2021

VISIONS OF SPEARHEADS AND THEMES	ICT & Digital - Utilisation of digital technology, increasing the number of competent people.	Climate, Circular Economy & Sustainable Development - Development of the bioeconomy and circular economy cluster and new production.	Competence & Labour Force - Securing the supply of competent workforce, successful integration of foreigners.	Well-being & Culture - Improving the status of health and well-being. Availability of health and social services in the entire region.	Innovation, Enterprise & Growth - Growth of international business and competence therein. Companies that save the environment.	Accessibility & Regional Structure - Implementation of spearhead projects. Enabling remote work and enterprise. Sustainable regional structure.

Machine technology and energy technology

Smart and productive technology and service, successful energy transition.

Forest industry

Diverse utilisation of wood material, increasing added value, emergence of new products.

Food products

The leading region in sustainable food production.

Well-being technology

Better health care and business through health data and new medicines.

Tourism

Growth in nature travel, event travel and cultural travel.
Development collaboration throughout Eastern Finland.

Intelligent water system

Smart and comprehensive management of water and waste water systems.
Growth of business activity.

Biorefining

New products and bioprocesses, biogas, recycled fertilisers, animal bedding, chemicals, energy.

1. SPEARHEADS OF POHJOIS-SAVO'S DEVELOPMENT – SMART SPECIALISATION

The regional plan sets out the region's long-term objectives, development strategy and population targets. The regional strategic programme outlines the practical measures that guide the regional development and allocation of regional funding for the next four years. The regional strategic programme is based on the Act on Regional Development and Implementation of the European Union's Regional and Structural Policy (47/2021) and the supplementary Decree (756/2021).

The regional plan is prepared in cooperation with the municipalities, government authorities as well as entities and companies participating in the development of the areas. The regional plan and the regional strategic programme are prepared for four years to cover the term of the municipal councils, and they are approved by the regional assembly. The regional plan 2040 and the regional strategic programme 2022-2025 were approved by the Pohjois-Savo regional assembly on 15 November 2021.

The spearheads of development were selected based on four rounds of company interviews (approx. 300 company contacts) in the years 2009, 2013, 2017 and 2021 and on discussions held with municipalities, development actors and research and educational organisations.

The spearheads are also the strategic choices for smart specialisation in Pohjois-Savo. The selected key areas are: (1) machine technology and energy technology, (2) forest industry, (3) food products, (4) well-being technology, (5) tourism, (6) intelligent water system and (7) biorefining.

The table (on the left) summarises the objectives of the spearheads and themes of regional development.

The following themes are common to all the spearheads of development: ICT & Digital; Climate, Circular Economy & Sustainable Development; Competence & Labour Force; and Innovation, Enterprise & Growth. Under the themes Well-being & Culture and Accessibility & Regional Structure, the development measures concern all the spearheads.

The first three spearheads form the backbone of the region's economy and exports, and they continue to get stronger and evolve dynamically. The other four spearheads represent emerging fields and industries. Energy technology is undergoing a transition due to environmental protection concerns, including the emergence of novel energy sources. In machine technology, new manufacturing processes and practises are creating a new competitive advantage. The food industry is becoming more diversified owing to the advancement of circular economy in primary production, among other things.

Health technology and well-being are the strongest fields of research in the region. The ageing of population calls for development in the field and active application of related knowhow and technologies to actual services and business activities. Tourism is related to the well-being of people and utilisation of the area's potential in business contexts. In water management and biorefining, it will be absolutely necessary to harness the competencies and new opportunities in order to respond to the need to develop low-carbon solutions and counter climate warming.

The RDI ecosystems of Pohjois-Savo have been put together around the development spearheads. With the exception of the forest industry, each spearhead's RDI activities and related collaboration activities have their designated persons-in-charge and contact persons. The ecosystems' joint operation, service design, customer service, marketing and funding attainment will be developed further towards a more systematic operating model with expert support provided through a development project. To support customer service in every ecosystem, two functions have been set up: Business Center (service network) and DigiCenter (digital innovation hub). They also provide development services to corporate customers, spin-off companies

and students, among others. Efforts to improve the RDI ecosystems' service concept and service capacity will continue during the new regional strategic programme period.

1.1 Highlights of the objectives of the regional plan and regional strategic programme

- Digital and software competence and enterprise, availability of competent persons and increased allocation of resources to training (University of Eastern Finland/UEF, Savonia University of Applied Sciences/UAS, preparatory vocational education), new rights to issue degrees are required for UEF and Savonia UAS, among others (in subjects such as data science, AI, software technology and data network technology), and the DigiCenter digital innovation hub should be made a permanent fixture.
- New openings in technological higher education: UEF (M.Sc. Eng. degree in sustainable materials engineering and engineering physics), Savonia UAS (BBA in data processing and B.Eng. in industrial engineering) – joint advocacy.
- Strategic partnership between education providers, employers, employees and developers in competence production. Companies' decisions on where to position their development functions are guided by the availability of crucial experts and corporate partners in different locations.
- Securing the funding for natural resources training (Ylä-Savo Vocational College/YSAO and Savo Consortium for Education/Sakky) and strengthening the operational resources of primary production development functions (Natural Resources Institute Finland/Luke and its partners) in Maaninka and Suonenjoki.
- The appeal of the areas and the availability and sufficiency of workforce in the region. Region-wide and area-specific measures. Improving workforce availability through education, immigration, commuting within the travel-to-work areas, remote work, multilocality and adequate services.
- Encouraging competent and committed international workers and students to relocate into the area through related measures and a coordinated operating model.
- Providing accessible health and social services, child care and education across the entire region, thus enabling sufficient basic services and feasible living and business opportunities also in small municipalities.
- Adequacy of health and social sector workforce. Improvement of people's state of health and well-being and increasing their labour force participation.
- Improvement of well-being and increasing labour force participation rate and employment rate -> more labour supply.
- Successful implementation of the energy transition. Distributed energy generation including biogas and utilisation of waste heat, energy storage, digital control of energy networks, wind power.
- Establishment and development of a bioeconomy and circular economy cluster in the region. Adoption of a circular economy, a circular economy culture and leadership in the field. New processes, raw materials and products based on the circular economy, e.g. chemicals, energy, recycled fertilisers and animal bedding.
- Increasing investments in industrial and ICT services, increasing productivity to renew workforce and improve competitiveness, among other factors; growth has relied excessively on residential construction.
- The steering effect of the EU's environmental directives on inputs made in sustainable R&D and on industrial production and the competitive advantage arising from this.
- The area's digital connections and physical accessibility (Savonian railway and Kuopio rail yard, Finnish national roads 5 and 9, flight connections and airport connections

within a 120-km radius, the lower-level road network connections for the needs of industrial transports). Joint advocacy of projects.
- The municipalities' quick and flexibly responsive land use planning and the enablement of remote work in the regional structure.

1.2 Measures are required due to the profound transformation of society

Over the next 10-20 years, the region of Pohjois-Savo will encounter a number of deep-reaching changes. These changes, considered as a whole, will be the most impactful ones that the region has faced since the building of the electric power network and the establishment of the elementary school network over one hundred years ago. The ongoing and ever-intensifying transformational changes will drastically reshape the operational environment in the region. For the purpose of facilitating adjustment to the new circumstances and utilisation of emerging opportunities, regional development policies have been devised and measures have been outlined in the regional strategic programme.

A demographic transition

The population is ageing all over the country, and particularly rapidly in Eastern Finland. The declining numbers of youth that reach the age for enrolling in upper secondary and tertiary education affect the competitive situation between education providers and the availability of training provision in different regions. The transformation will also reflect on workforce availability. Most trades and industries may experience labour shortages. The problems may become most pronounced in areas outside growth centres.

The supply of workforce will decrease, as more and more people retire and fewer young people replenish the workforce. Both Finland and Pohjois-Savo may well be facing a chronic labour shortage, and this problem needs to be solved so as to ensure that businesses and public services remain sufficiently staffed to continue their operations.

The number of potential internal migrants in Finland will drop, particularly in those areas from where people typically relocate to Pohjois-Savo. Therefore, Pohjois-Savo will have to become a more attractive target area for internal migration, also to people outside Eastern Finland.

The challenge will not be met by acquiring labour force and students from abroad, unless such foreign migrants become successfully attached to the region, find employment there and can assimilate into it and unless a positive approach to multiculturalism gains more ground in work communities. The currently applied systems and methods of immigrant integration are inadequate. It has also been experienced that the services offered to foreign workers, students and asylum seekers are fragmented and therefore ineffective.

A transformation concerning the environment, energy and economy

The effects of the measures taken to prevent climate warming encompass the entire economy. These measures require us to make adjustments, but they also offer substantial new opportunities for many industries and business professionals, provided that we succeed in the competition of ideas and technologies.

Circular economy will gain more ground, and recycled materials will be in higher demand and their application will increase. The concept of waste will change from how we understand it now, and products will be designed to have long lifecycles. The bioeconomy will also grow as part of the circular economy, as the flows of materials, nutrients and energies in the economy and nature are harnessed in novel ways by applying new or existing biorefining methods. Agriculture and forestry are part of the bioeconomy and circular economy, constituting a natural element in the resolution of environmental problems.

Companies will shape their RDI activities around competitive factors that help save the environment. Funding providers will learn how to also evaluate new and previously unknown opportunities and risks in the development of new technologies, production systems and products.

Energy efficiency and material efficiency will turn into everyday necessities. The energy transition will be all-encompassing, and its successful implementation will require high-level research and development together with investments. The different types of energy provision to emerge in this context include low-carbon power, bioenergy, agricultural and industrial biogas, energy/heat recovery, geothermal energy, solar power, wind power, energy storage systems and hydrogen economy, as well as any future possibilities that are unknown as of yet. Traffic will be transformed to feature new energy sources along with the existing ones.

If we fail to see through the energy transition, we will have to pay dearly for the energy we use in the times ahead.

A technological transition

When companies compare different regions to determine where to set up their operations and development functions, their decisions are guided by two factors: the availability of professionals competent in key technologies or working in emerging fields of expertise, and the proximity of corporate partners developing these technologies. It is essential to be able to meet the needs for such capabilities that are critical and that have a substantial impact on the companies' operation.

In the coming years, such functions and product-altering technologies include digital transformation, smart technology, artificial intelligence (measuring, monitoring, computing, analysis and reasoning), automation and collaborative robots, electrification and analysis, interpretation and control of language, images and machines. In short, digital technology with integrated intelligence will become a prerequisite for the operation and success of many services and machine technology solutions.

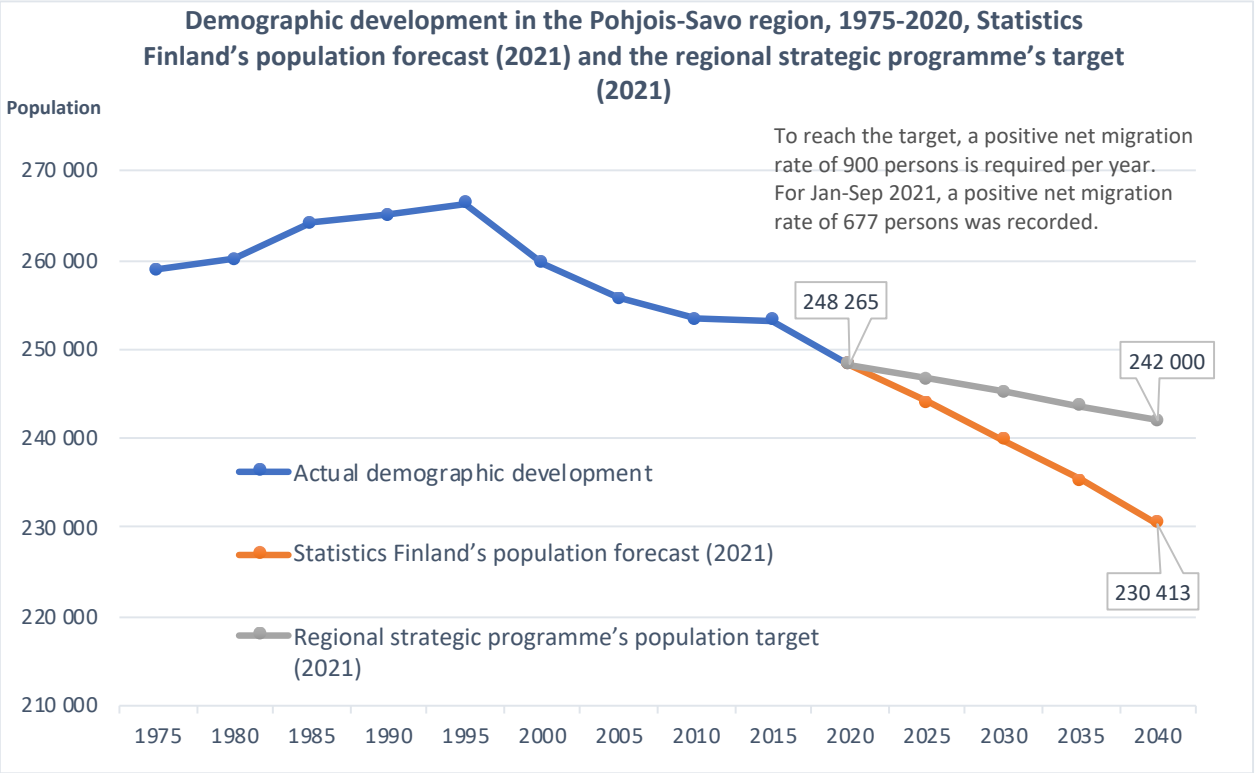
Service structures and regional structure in transformation

Service structures undergo changes due to business-related and demographic factors as well as through political and administrative decision-making. The positioning of the sites for providing health and social services and the location and accessibility of educational services have an essential impact on how successfully municipalities and companies can operate in an area and how purposefully people can run their lives there.

The vitality of municipalities is largely decided by the local offering of health and social services, the jobs existing there and the availability of workforce for the employers. To lose these services would be particularly devastating. Of educational services, early childhood education, primary and lower secondary education, general upper secondary education, vocational training and higher education are the ones that factor in on the location decisions of families and young people and affect workforce availability in an area.

Will the entire Pohjois-Savo remain vital, or will the necessities of everyday life and business be concentrated in the Kuopio subregion, possibly also in the Iisalmi and Varkaus subregions? Or will Southern or Western Finland come out on top?

If such concentration does takes place, most of the companies based outside the central areas will eventually be lost.



1.3 Population targets – aiming at 242,000 residents

The population target of Pohjois-Savo for the year 2040 is 242,000 residents, which is 11,600 residents (5%) more than in the forecast of Statistics Finland. The new target has the number of population decreasing by 6,300 residents from the current level, compared with a drop of 17,900 in Statistics Finland's forecast (2021) that estimates Pohjois-Savo to have 230,400 residents by 2040 (the municipality of Joroinen included). For the region's own target to be reached, an annual net migration gain of an average of 900 persons is required.

The reason for the estimated population decrease being less than in Statistics Finland's forecast is that the population target modelled for the regional strategic programme projects a more moderate decline in the number of children and working-aged people in Pohjois-Savo. In the population target model, the number of 15–64-year-olds is estimated to decrease by just 8,200 people by 2040, compared with a markedly larger drop of 18,000 people in Statistics Finland's forecast. In the model, the number of 0–14-year-olds is expected to drop by 5,900, as opposed to a decrease of 7,600 as forecast by Statistics Finland. The modelled number of over 65-year-olds is close to that stated in Statistics Finland's forecast.

In terms of demographic structure, Pohjois-Savo has an aged population; by 2040, about 30% of the region's residents are over 65 years old. In the model, the impacts of ageing on the region's business activity and public economy are mitigated by the more modest decline in the numbers of working-aged people and children than what has been forecast before. If the modelled population target is not reached, the reduction of the number of working-aged people will deteriorate workforce availability already in the near future. Correspondingly, the decrease in the number of children will reduce workforce availability in the coming decades.

The population target assumes a birth rate

Pohjois-Savo region (subregions total)	2020	2025	2030	2035	2040
Migration diff./year/preceding period	368	731	879	950	1 067
Internal migration diff./year/preceding period	-142	6	99	110	187
Net migration/year/preceding period	510	725	780	840	880
Births-deaths/year (avg./year/preceding period)	-1 106	-1 051	-1 168	-1 263	-1 394
Workforce (no. of people)	112 050	108 460	107 700	108 750	110 200
Jobs	100 026	100 178	101 370	103 430	105 490
Net commuting	-1 063	-800	-350	-130	-50
Unemployment rate (%)	9,8	6,9	5,6	4,8	4,2
Population 31 Dec (no. of persons)	248 300	246 650	245 200	243 650	242 000
0-14-year-olds	35 590	32 900	30 210	29 720	29 720
15-64-year-olds	148 330	143 920	141 370	139 470	140 180
Over 65-year-olds	64 350	69 810	73 610	74 440	72 110

and mortality rate that are on par with those recorded in 2018-2020 for the different age groups.

1.4 Practical measures required for the population target to be reached

This population target has been modelled to represent the kind of realistically feasible demographic development that would make it possible to ensure the supply of labour required by the services, industry and primary sector and to maintain the vitality of the entire region. With the diminishing labour supply outside the Kuopio subregion, growth of business activity will need to be based on a substantial increase in productivity (through automation, among other means), a positive net migration balance of people in the workforce and utilisation of commuting and remote work opportunities. In public services, collaboration of municipalities and the partnering of the municipalities and the state are important factors in ensuring the availability of educational, cultural and health services, for example, over the entire region. The measures and services that maintain the supply of labour across the entire region must be considered as part of the health and social services reform.

In the model, labour supply has been assumed to increase from the current situation by increasing the shares of workforce per age group by 5% in the Kuopio subregion and by 2.5% in the other subregions. The model has the share of middle-aged workforce increasing to 94.9% in the Kuopio subregion; at the low end of the spectrum in North-East Savo and the Varkaus subregion, the corresponding share is projected at 90%.

In addition to increasing the projected share of workforce as described above, labour supply has also been improved in the model by increasing the net migration gain in the Kuopio subregion and by reversing the migration flow to be slightly positive in Upper Savo and the Varkaus subregion during the planning period. The regional target for the number of population in Inner Savo and North-East Savo is at the level

of Statistics Finland's 2019 forecast which foresees an optimistic migration trend for these subregions. Should the modelled net migration gain and increase in labour force participation not materialise, labour supply will not be adequate to enable as many jobs in the said subregions as presented below.

With the above measures, labour supply in the region in 2040 will be 110,200 persons, some 10,900 more than in Statistics Finland's forecast. In the model, the number of workforce will only drop by 1,800 persons, although the population will decrease by 6,000. The model assumes full employment (an unemployment rate of around 4%), which together with the increase in the labour force participation rate will allow an increase in the number of jobs by about 5,000.

For the modelled scenario to become reality, the net migration gain needs to be more on the positive than at present, labour migration and student migration have to start growing and labour force participation must also increase. Its prerequisites are a considerable improvement in the state of health of the population, a reduction in school dropout and social marginalisation rates, continuous development of labour force competencies and well-being, commuting to areas where workforce is needed, an increase in the region's appeal as well as labour immigration and student immigration.

For example, if there is no increase in commuting to areas outside the Kuopio subregion, such areas will experience difficulties in obtaining workforce.

In many subregions, any positive net migration will be wholly based on migrants, and a majority of the net migration gain in the other subregions will also be attributable to them. The successful achievement of a positive net international migration balance as shown in the model requires efforts to increase the region's appeal also from the viewpoint of foreign people, since there is ongoing competition for competent foreign workforce both within Finland and internationally.

To keep the modelled growing flows of international migrants from draining out of the region and to successfully persuade competent foreign workforce to stay in Pohjois-Savo, considerable inputs are needed in services supporting the newcomers' integration and permanent settlement into the region. Internal migration of foreign-language population in Finland is still more concentrated than that of native language speakers; at present, it focuses on Southern Finland.

With these many changes and measures, we are able to increase labour supply in relation to the population base, which enables the region's dynamic development. The model portrays a perfect success for the region, enabling an increase in the number of jobs despite the population decline.

However, if the demographic development continues as forecast by Statistics Finland, labour supply will decrease by 11,000 persons. This will mean a corresponding decrease in jobs and an increase in the need for health and social services, unless people become healthier and capable of longer working lives at a higher competence level.

2. REGIONAL STRATEGIC PROGRAMME'S DEVELOPMENT OBJECTIVES IN SPEARHEAD FIELDS

The table below presents the development objectives for the spearhead fields of business and industry in the region. It also constitutes Pohjois-Savo's strategy of smart specialisation.

DEVELOPMENT SPEARHEADS	ICT & Digital	Climate, Circular Economy & Sustainable Development	Competence & Labour Force	Innovation, Enterprise & Growth
Machine technology and energy technology 	Digitalisation of processes and services Availability of ICT experts Dispersed energy and digitality Road map of ICT/ productivity development for companies.	EU's environmental directives; sustainable R&D CO2 sequestration Electrification Dispersed energy and digitality: heat pumps, energy storage geothermal energy	Strategic partnership with companies Key actors: DigiCenter, UEF, Savonia UAS, FITech International workforce Demand for ICT experts Machine technology welding technology	Investments ICT SMEs in AI/ smart technologies Start-ups: digital services, products and consultation New products Business successors Funding for start-ups
Forest industry 	Measurement technology in forests and production Knowledge-based management Forest data, logistics data Remote monitoring Material efficiency Warehouse optimisation. Wood construction and digitality, automation	Carbon sinks, biodiversity and limitations to harvesting securing wood supply Recycling/ use of by-products Wooden buildings as carbon sinks New products, biophilic design	Measurement and digital competences Networked supply chain management Demand for industrial electricians Chemistry competence Process technology; Wood element construction and assembly	Robotisation Niche markets Biorefining Wood construction (wood + concrete) cluster thinking > demos, plastic industry collaboration, start-ups
Food products 	Traceability and safety of food products Health data E-commerce Digitalisation and robots	Carbon-neutral food production Sustainable food system utilisation of by-products Local food in public procurement	Education and training in primary production High labour demand Attracting seasonal workforce Competences in food processes, dairy industry E-commerce	Profitability Small carbon footprint Development networks customer-oriented R. Milk, meat, berries, fish LUKE network
Health technology and well-being 	Cybersecurity Utilisation of health & wellness data AI into business	Digital and remote solutions	Data analytics, wireless technology, regulatory/quality competence Master's programme Sales, marketing, commercialisation	Innovation procurement, innovation, mentoring & incubator services BusinessCenter, capital funding Economics & medicine

DEVELOPMENT SPEARHEADS	ICT & Digital	Climate, Circular Economy & Sustainable Development	Competence & Labour Force	Innovation, Enterprise & Growth
Tourism	Multi-location living & work Digitalisation, roadmap of digital solutions Service provision, digital nomads Smart Tahko. Enhanced reality, AI, Virtual travel. Digital development in marketing	Sustainable and safe tourism Nature travel Forestry & recration Kuopio-Tahko and regional growth targets Green business, sustainable travel, nature values of route networks. Climate-friendly transport, virtual travel products	Adventure tourism Labour demand in sport & wellness services, cleaning services Region's marketing organisation Entrepreneurship education Attracting work force & encouraging mobility, immigration	Tourism development & sales Collaboration between businesses, networks Service packages & service chains Customization & experiments Pop-up & light entrepreneurship Product, service and cultural innovations Investments
Intelligent Water System	Comprehensive management and optimisation of systems	Operating necessities for water-intensive industry Industrial and wastewater recovery Water/energy efficiency Primary production water pollution management	Succession of workforce in water supply plants Digital skills, transfer of competence from data science	Digital services, Network operation Accelerated market entry through various ecosystem
Biorefining	Process measurement technology, monitoring, visualisation, logistics AI and database learning Scalable thermal biorefinery equipment	Bioeconomy/ circular economy cluster Biogas production and distribution network development Recycled fertilisers, growth mediums, animal bedding By-product efficiency in primary production and food production	Fermentation, heat treatment, separation, cleaning, analytics, and processing Competence in biotechnology sensor technology, data analytics and marketing	Biogas market High-value products through fermentation, hydrogen, industrial hemp Enterprise based on biogas and traffic fuels Biocarbon and bioliquids

Machine technology and energy technology

This spearhead has the following key objectives: digitalisation of processes and services, increased productivity through more automation and process streamlining, sustainable RDI activities and an increase in distributed energy production. The technological implementation of the energy transition and distributed energy production requires considerable development inputs in alternative energy technologies and in heat and energy storage systems. Additional objectives are development of strategic corporate partnerships, strengthening the competencies of education providers, ensuring the availability of ICT specialists, achieving growth in industrial investments and facilitating the emergence of new business in digital services and consultation services that support product development.

Forest industry

The conventionally strong spearhead has the following key objectives: improving overall productivity by improving the management of the entire production chain and the logistics operations through utilisation of measurement technology, collected data and coordinated control of production chains. In the future, the industry will be required to ensure availability of wood, manage the by-products and material flows formed in the production chain and reuse them in biorefining in various ways. Additional objectives are enhancing wood construction, achievement of carbon neutrality and boosting different areas of competence in production.

Food products

The food-based spearhead has the following key objectives: improving the traceability and safety of foodstuffs, developing production by relying on automation and artificial intelligence, utilising by-products, reducing wastage and establishing a sustainable and carbon-neutral food system. Additional objectives are ensuring the availability of training and workforce in the field and strengthening the R&D ecosystem in agriculture, berry farming and the food industry.

Well-being technology

The well-being spearhead has the following key objectives: creating new operating models and business through utilisation of artificial intelligence and health and well-being data and supporting sustainable development, cost efficiency, accurate diagnostics and customer service in health care with the aid of digital solutions. Additional objectives are increasing regulatory, quality and product management competencies in the field with new master's programmes, boosting business competence and developing business activities in the area by promoting innovative procurement and supporting companies in entering into international markets. Pharmacological development, such as development of vaccines, is one of the strengths of the scientific community in Kuopio. Service development is part of the measures that fall under the wellness theme and are related to the new well-being service county.

Tourism

The tourism spearhead has the following key objectives: responding to the changing consumption behaviour of tourists and the green transition with the aid of digitalisation and developing the industry to adhere to the principles of sustainable development. Additional objectives are strengthening entrepreneurship based on adventure activities as well as digital services in the field, supporting the industry in competence and labour force matters and boosting industry growth through network-based joint development. Development of tourism would need to be headed by a strong leading company to which all the most important actors trust.

Intelligent water system

The water system spearhead has the following key objectives: comprehensive management and optimisation of water systems with the aid of digital methods and ensuring that companies in water-intensive industries can continue operating successfully through development of waste water technologies. Additional objectives are ensuring sufficient numbers of competent people in water resources management and accelerating the implementation and market entry of water technology innovations with the aid of innovation ecosystems.

Biorefining

The biorefining spearhead has the following key objectives: development of material logistics with the aid of artificial intelligence, utilising by-products as materials, energy, new products, fertilisers and growth mediums and boosting the utilisation of digestion of agricultural slurry and plant waste as well industrial by-products into biogas. Additional objectives are development and strengthening of biotechnical competencies and production in the area and supporting the emergence of new enterprise in the field through the development of an operational bioeconomy and circular economy cluster, among other measures.

3. JOINT DEVELOPMENT THEMES FOR THE SPEARHEADS

The regional strategic programme's selected development themes cover a number of concrete development needs that many spearhead fields of business and industry have in common between them. However, the development needs concerning well-being and culture as well as accessibility and regional structure cannot be aligned with any specific spearheads. They are described in this chapter.

ICT & Digital	Climate, Circular Economy & Sustainable Development	Competence & Labour Force
UAS's degrees in data processing and coding Higher education in technology UEF: smart technology (data science, AI, IoT) ICT training path UEF, Savonia and Karelia and FITech collaboration Keeping pace with technological development AI, digital twin, automation, remote management, data connections Digitalisation of enterprise resource planning Digitality and multilocality	Circular economy culture Bioeconomy & circular economy cluster Commitment to climate targets EU's environmental policy, UN's sustainable development goals Product life cycles, customers and governments in steering R&D Dispersed energy Utilisation of by-products in circular economy, Lower emission pulp industry CO2 sequestration Electrification of machinery Efficient energy and water use Availability of wood chips Result-oriented climate policy Bioiversity Climate resilience > longer growing season, plant diseases, abiotic damage etc.	Health and social sector workforce International recruitment Trainee opportunities and employers commitment to employ Responsible organisation Enhanced competences of workforce: employers & education Dropout prevention Strategic development of competence with business clusters: ecosystems Savonia UAS) M. Sc. (Eng.), FITech and education collaboration Problem solving abilities, self-direction, project and co-op competences Automation, ICT, data processing, digital processes, in upper secondary and higher education, vocational qualifications, continuous learning Regional workforce & allocation of funding according to labour demand Availability of competence: clusters, hybrid training, facilitating proximity of training, business participation, continuous learning & workplace training Foreign employee training International sales & marketing, Image marketing

Well-being & Culture	Innovation, Enterprise & Growth	Accessibility & Regional Structure
Well-being and health improvement on population level with emphasis on young people	ICT SMEs in AI/smart technologies	Region's accessibility
Occupational health care coaching	Industrial investments	Corporate investments amounting to 800 million €
Workforce participation	Business succession	Shortening travel times
Multi-cultural work communities	Company networks & innovation, education & research and sustainable development	National roads 5 and 9
Prevention of social marginalisation & substance abuse (young people)	Entrepreneur education	Kuopio Air traffic & feeder transport
Introduction of Wellbeing service county	Business design Flexible production, investments	East Rail railway line making Savonian Railway faster
Companies and RDI activities in health and social services reform Digital health and social services	Start-ups: digital services, products & consultation	Kuopio rail yard development
Organisation & (remote) management (of experts)	Subcontractor networks and global services	Low level road network upkeep
Semi-rural area marketing	International capital funding for start-ups	Goods logistics optimisation
Natural environments	Facilitating start-ups, internationalisation, collaborations with established companies (pilots)	Transport subsidies
Agri-cultural landscapes	Robotisation and digital business Financing for business transactions & large-scale production investments	Digital accessibility: broadband
Clean water systems	Business succession in companies	Enabling remote work
Culture for well-being and regional appeal, events.	Targeted compilation of products and services to markets	for quality of life
Food & well-being Culinary culture	Creativity and multi-disciplinarity for innovation	Secondary residences
	Branding of innovative food products	Appeal of region and businesses
	Shared visibility (marketing) of local products, funding for market entries	Familiarity of strengths and capabilities
		Municipal industrial facilities
		Business & industrial parks Building plot availably
		Land use planning resources
		Circular economy areas e.g., Riikinneva
		Competence clusters:
		Ylä-Savo (machine tech.) Kuopio (health)
		Varkaus (energy)
		Berry farming zone,
		Milk zone, Savilahti
		Water & nature travel, national parks
		Route networks, air, road, rail connections
		Land use planning/investments
		Cost pressures due increasing sea freight prices
		VR's railway monopoly

ICT & Digital

Increasing the competencies and the number of competent people in ICT, digital business and the software industry is one of the most important themes brought forward by companies in the course of regional strategic programme preparation. Related development activities are required across all the region's spearhead fields; therefore, the theme will be focused on and invested in as a cross-cutting technology and competence. Application of increasingly digital working methods and machines will render some of the work free from time and place constraints for a part of the workforce. There will be greater opportunities for remote work and remote control of machines.

The demand for software specialists will increase; already there is a shortage of them. Thus it is necessary to increase training volumes in software programming, computer coding and data processing and grant UEF and Savonia UAS the right to issue new degrees in these fields. Moreover, it is necessary to engage in training and research collaboration with other higher education providers in Finland and abroad. In a development measure falling under the theme, the DigiCenter digital innovation hub was set up with participation from UEF and Savonia UAS, among others. DigiCenter has diverse expertise and practical tools available to support companies in the development of their ICT activities. DigiCenter's activities were launched with project funding, but the digital innovation hub should be made a permanent fixture.

Climate, Circular Economy & Sustainable Development

The industries that are engaged in global business and exports are of the opinion that their business will benefit from their efforts to achieve environmental goals. One aspect of circular economy and sustainable development is to plan entire lifecycles of products so as to make them manageable and reusable in some shape or form. Customers have increasing expectations for practical measures relating to circular economy, and these must be integrated into R&D objectives.

Utilisation of by-products from different production fields in the circular economy requires harnessing of multi-professional knowledge and competencies as well as introduction of new technological solutions in processes. Some of the technological solutions involved may be well-established and highly familiar, but the problem is that customers do not have the readiness or knowledge needed to shift into using recycled materials or nutrients.

Therefore, development of circular economy requires a new approach that embraces out-of-the-box thinking beyond boundaries. Successful establishment of a circular economy cluster is set as an objective. In a circular economy, many by-products created in agriculture, energy production, waste water processing, different industries (such as forest, food, machine, process) and construction can be utilised as energy, fertilisers, animal bedding, growth mediums, new materials, construction supplies, pesticides, cleaning agents, filters, adhesives and surface treatment materials, and carbon dioxide can be converted into various carbon-based materials or gases.

Competence & Labour Force

Pohjois-Savo and Eastern Finland face the threat of labour shortage even to a greater extent than the country as a whole; the number of workforce will decrease due to the prevailing trends in age distribution and demographic development. Labour supply will deteriorate in areas outside Kuopio and Siilinjärvi. A multitude of measures to increase workforce availability are required in those areas. If the region's population target can be achieved, the workforce availability situation in the Kuopio subregion will be good; however, should actual development be in line with Statistic Finland's forecast, the situation will become more difficult in the said subregion as well. Additionally, high morbidity and a low labour force

participation rate will reduce the number of employees in the diminishing age groups in Eastern Finland.

Education faces a demanding task of increasing labour supply and providing up-to-date competencies to employees of all ages. All young people should be encouraged to successfully engage in professional or vocational training. This requires not only a diverse and easily accessible training provision but also support measures for families, young schoolchildren, students and those at risk of social marginalisation.

In public funding of education (Ministry of Education and Culture), consideration has to be paid to the needs arising in the labour market, namely the need for workforce and the need for continuous learning of new things. At least in vocational and higher education, the scope of training funding cannot be dimensioned based on the sizes of young age groups; instead, it should be guided by the needs of the businesses and services.

Improvements are needed not just in youth education but also in continuous learning of working people. Production efficiency has to be enhanced through increasing utilisation of automation, digitalisation and other new tools, among other measures.

Strategic development of competencies in collaboration with business clusters and education providers constitutes a long-term approach to the development of up-to-date training in educational institutes, companies and other workplaces for employees and students, flexibly adapting to needs for change. Savonia UAS is involved in advancing this model. One way of putting together strategic competence clusters is represented by the clusters of RDI ecosystems. They correspond to the regional strategic programme's development spearheads.

Well-being & Culture

In order to secure the sufficiency of workforce in Pohjois-Savo, it is absolutely necessary to improve the state of health of the region's population across all age groups. This provides added benefits by mitigating the growth of expenses in health and social services and ensuring adequate availability of these services.

The health and social sector and the changes relating to it are a key factor in regional development. Well-being services are the most substantial employment provider in the region. About one out of five working people in Pohjois-Savo are employed in health and social services. The health and social sector and well-being technology are a source of research, training and innovations.

The location and accessibility of the health and social service units play an important part in the different municipalities' ability to attract and retain residents, and their significance also reflects materially on the companies' operating environment, availability of competent workforce and improvements or shortcomings in the well-being of population. This is something that should be understood in the preparatory work for the health and social services reform. The health and social sector is in no way a separate part of society detached from overall societal development.

Well-being can be promoted through collaboration between all the different actors. With the health and social care reform taking effect, the municipalities and the new well-being services counties will be jointly tasked with looking after the residents' health and well-being. The objective is to shift the focus of health and social service activities from burdensome service provision to prevention and early intervention and support. The residents should have direct and effortless access to these services.

An active cultural and artistic scene strengthens the positive image of Pohjois-Savo by making the region more pleasant to live in, helping it attract new residents, building and fostering a sense of community, stability and diversity and having a favourable impact on the well-being and health of people. Furthermore, social participation and engaging in cultural activities are associated with good mental health.

To make these benefits more evenly accessible to all, cultural activities and services should be guaranteed adequate resources in every municipality in Pohjois-Savo. The municipalities and different producers of culture can engage in deeper collaboration with one another.

Working life skills of young people should be built up as early as possible, and school dropout rate needs to be reduced with effective measures. Generally, more places are needed in the region that are easily accessible to youth and where they can just be themselves. As for cultural life, young people long for a multitude of varied events.

Innovation, Enterprise & Growth

Companies perceive investments in ICT, software, AI technologies and related competencies and consultation as an important growth and success factor. They hire people that have such competencies and look for strategic partnerships with companies specialised in the field. There should be more of this business activity as well as new start-up business activity and partnerships supporting the technological makeover of products, production and services.

Availability of competent personnel and development partners in the said fields also plays a part in companies' decision-making regarding the locations they choose for their development functions. Private providers of business funding are also expecting more industrial investments to diversify the base of the economy and entrepreneurship. Residential construction should not be overemphasised in the making of investments.

Business activities need to be adjusted towards flexible production, which involves automation, smart production systems and production network management as well as investing in employees. Innovations and other new solutions can also be discovered through networking cooperation between companies, research bodies and education providers in evolving joint ecosystems. Newly started businesses must be steered towards growth by means of competence, development of activities and financing.

The need for operating premises persists, and municipal industrial facilities are still required particularly in areas where the private property market is thin. Company owners are ageing, as are their employees. New owners and corporate transactions are needed, and the operations of both individual companies and groups of companies require revamping.

4. ACCESSIBILITY & REGIONAL STRUCTURE

The region's accessibility

The accessibility of Pohjois-Savo for traffic is a crucial matter for all business life, the appeal of the region and the smooth functioning of the services, education and health care. Alongside road, rail and air traffic, the significance of data connections has become more and more emphasised, as virtually all societal operations have become dependent on highly efficient and functional digital communication.

In the next five years, twenty leading companies in the region alone are set to invest more than 837 million euros into development and expansion of their production, according to a survey conducted by the Chamber of Commerce. These investments will necessitate recruitment of over 1,350 persons. The considerable growth in investments will substantially boost transport volumes and the need for developing traffic connections, given that the investing companies are engaged in exports.

Shortening of travel times is a key consideration in the development of the traffic network, as it affects the efficiency of corporate activities in many respects, such as business costs, raw material transports, subcontractor network operations, export operations and provision of customer service. The most important traffic routes that need to be made faster are the national roads 5 and 9 and the Savonian railway as pertains to passenger traffic. On national road

5, there are two stretches of road that require improvement and need to be made faster over the next few years, namely the section between Leppävirta and Kuopio and the section between Siilinjärvi and Iisalmi. A solution to bypass the Nerkoo village requires urgent attention, owing to both traffic safety and the exceptionally poor traffic flow there. On national road 9, bypassing the centre of Riistavesi is a matter of urgency; however, the entire route between Jyväskylä and Joensuu via Suonenjoki and Kuopio needs to be developed at intersections of industrial zones and at any points that are problematic in view of traffic safety and the through flow of traffic, among other places. The road connections between towns and larger villages need to be maintained in good condition, so that people can rely on them, for example, when going to work or school by car or bus.

As for the region's railways, the Savonian railway requires a number of measures, including replacement of level crossings at various points with underpasses or bridges, introduction of safety technology and basic track repairs. Additionally, the revamping of both the passenger rail yard at Kuopio station and the adjacent freight rail yard should be completed promptly. The Savonian railway and the said rail yards are in an exceptionally poor shape, and their traffic flow capacity is equally poor, even in national comparison.

Beside the main roads, the networks of less frequented roads are also absolutely necessary for the transport of wood, milk, meat and berries. These roads must be kept in such condition that their use is not prevented by occurrence of ground frost, and they must also be adequately maintained in wintertime.

Appeal

The significance of the appeal of the areas and the need to enhance it came up in all the discussions held with companies in the course of regional strategic programme preparation. Appeal means many things: good education provision, diverse services, various cultural services, business clusters, well-known companies, availability of RDI services, living in pleasant and clean natural surroundings or built environments, good offering of building plots and premises, ease of daily activities, good traffic connections and efficient logistics.

The competence clusters of education providers and business activity are profiled as follows: machine technology in Upper Savo, health technology in Kuopio and energy technology in Varkaus. For milk production and berry farming, the most significant zones are Upper Savo and Inner Savo, respectively. The future of Luke Kuopio's Maaninka unit has been secured through new development measures, and the unit is engaged in significant development work that focuses on low-carbon farming, including dairy farming, and on bioenergy. Similar measures to boost the R&D activities and intensify collaboration are required for the development of berry farming and processing in Suonenjoki. Kuopio is becoming a strong actor in the development of intelligent water systems even by international standards.

Industrial properties owned by municipalities' property companies and situated in various industrial zones as well as a flexible offering of building plots in business and industrial parks continue to have practical importance in helping companies to set up operations and develop and expand them. Such industrial facilities of municipalities need to be included in the sphere of public development funding of corporate operating environments. This requires lobbying for the goal of amending the European block exemption regulation which currently precludes the application of development funding intended for corporate operating environments to financing municipal industrial facilities. Such municipal industrial facilities as described above are needed to relieve the capital funding needs of companies in areas where capital is in short supply and the private business premises market is limited.

In addition to involving smart and cost-efficient utilisation of by-products from differ-

ent actors, circular economy is translating into new business opportunities. Developing circular economy areas for different companies that process diverse materials will drive opportunities for innovation and reduce the costs of materials processing and logistics.

Pohjois-Savon liitto

Pohjois-Savo's regional plan 2040 and regional strategic programme 2022–2025, summary

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