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Damian Kedziora, Roosa Pipatti, Sonja Hyrynsalmi, Sami Hyrynsalmi

STATE OF IT & SOFTWARE INDUSTRY AT PÄIJÄT-HÄME REGION IN 2023

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Summary

In Päijät-Häme region, the information technology (IT) industry has witnessed substantial growth in recent years, propelled by the modernisation of the traditional sector through rapid technology adoption. This report is an attempt to capture the current state of the IT sector in Päijät-Häme region through surveys and interviews conducted among local actors, as well as an analysis of public statistical data related to the situation in the region.

With growing number of software engineering students graduating annually, Päijät-Häme has potential to become one of major hubs for graduate software engineers. Lahti's educational landscape offers diverse paths for expertise attainment, covering technical roles, IT support and computer programming. LUT University, LAB University of Applied Sciences and Salpaus Further Education collaborate to nurture a skilled workforce that aligns with industry needs and stimulates regional technological advancement.

Päijät-Häme's evolving landscape reveals dynamic trends and areas for growth in the industry. The region, with its favourable price-to-cost ratio for everyday living, maintains a competitive edge. Respondents in our interviews and in our survey anticipated the transformative impact of artificial intelligence (AI) on industries and emphasized the importance of collaborative ventures and networking for regional competitiveness. User-centric digital solutions were seen to gain prominence, underscoring the need to tailor technologies to user requirements. In addition, digital systems and services were expected to become prominent fields of expertise in education. Our survey unveiled key technologies used by the participating companies from the region, all renowned for their quality, efficiency, and security, driving product development and custom software creation.

Our study also identified that companies still face challenges in technical expertise, skills training, business understanding, resource availability, team dynamics and leadership. Support is required in areas such as operating model enhancement, technology networking, value chain creation and collaborative research funding. Moreover, gender equality needs to be fostered in the IT community; thus, the concerted effort should focus on encouraging more women to explore IT careers, leveraging the expansion of opportunities in the field in the region.

Efforts to enhance the ecosystem through cooperative projects and key player involvements are crucial for sustainable growth. Increased visibility and marketing of the

region’s IT development strategy can attract larger enterprises and investments. Understanding digitalisation’s potential within companies, coupled with actionable solutions, is a priority. Talent attraction and retention strategies, including remote working options and rural appeal, are gaining attraction. Strengthening industry presence, facilitating sales (including exports abroad), improving digital infrastructure, fostering networking opportunities and enhancing online collaboration form a comprehensive vision for the regional progress of the IT industry.

Tiivistelmä

Ohjelmisto- ja IT-teollisuus on Päijät-Hämeessä kasvanut viime vuosina voimakkaasti, ja sitä on vauhdittanut erityisesti perinteisten toimialojen modernisoituminen nopean teknologian käyttöönoton myötä. Tämän raportin tavoitteena on muodostaa tilannekuva Päijät-Hämeen IT-alan nykytilasta kyselyiden ja paikallisten toimijoiden haastatteluja avulle sekä analysoimalla julkista tilastotietoa alueen tilanteesta.

Päijät-Häme on nousemassa IT-alan merkittäväksi toimijaksi eri koulutusasteista vuosittain valmistuvien osaajien määrän nousun myötä. Lahden koulutusmaisema tarjoaa monipuolisia polkuja osaamisen saavuttamiseen, kattaen tekniset roolit, IT-tuen, ohjelmistotuotannon sekä ohjelmistotuotehallinnan. LUT-yliopisto, LAB-ammattikorkeakoulu sekä Salpaus-koulutuskeskus tekevät yhteistyötä kehittääkseen ammattitaitoista työvoimaa, joka vastaa teollisuuden tarpeisiin ja edistää alueellista teknologista kehitystä.

Päijät-Hämeen kehittyvä IT-ekosysteemi paljastaa dynaamisia trendejä ja kasvualueita. Alueen suotuisa elinkustannusrakenne, sisältäen asumisen ja elämisen kustannukset, tekee Päijät-Hämeestä houkuttelevan alueen osaajille sijoittautua. Raportin haastatteluihin ja kyselytutkimuksiin vastanneet asiantuntijat ennakoivat tekoälyn (AI, engl. *artificial intelligence*) muuttavaa vaikutusta teollisuuteen korostaen yhteistyöhankkeita ja verkostoitumista alueellisen kilpailukyvyn edistämiseksi. Käyttäjäkeskeiset digitaaliset ratkaisut korostuvat, mikä lisää tarvetta räätälöidä teknologiaa käyttäjien tarpeisiin. Tekoälyn ja digitaalisten järjestelmien odotetaan nousevan näkyviksi koulutuksen osaamisalueiksi. Tutkimuksemme paljasti tärkeimmät teknologiat, joita tutkimukseemme osallistuneet alueen yritykset käyttävät.

Tutkimuksemme osoitti myös, että yrityksillä on edelleen haasteita teknisen asiantuntemuksen, taitojen koulutuksen, liiketoiminnan ymmärtämisen, resurssien saatavuuden, tiimidynamiikan ja johtajuuden suhteen. Tukea tarvitaan muun muassa toimintamallin tehostamiseen, verkostoitumiseen, arvoketjujen luomiseen ja yhteistyöhön tutkimusrahoituksen hankkimisessa. Lisäksi tarvitaan toimia monimuotoisemman IT-alan eteen. Yhteistoiminnassa tulisikin siis keskittyä vähemmistöjen rohkaisemiseen IT-uralle hyödyntäen alan laajentuvia mahdollisuuksia alueella.

Ponnistelut ekosysteemin parantamiseksi yhteistyöhankkeilla ja avaintoimijoiden osallistumisella ovat ratkaisevan tärkeitä kestävän kasvun kannalta. Alueen IT-kehitysstrategian näkyvyyden ja markkinoinnin lisääminen voi houkutella suurempia yrityksiä ja investointeja. Digitalisaation potentiaalin ymmärtäminen yrityksissä yhdessä toimivien ratkaisujen kanssa on prioriteetti. Osaajien veto- ja pitostrategiat, mukaan lukien etätyömahdollisuudet ja alueen houkuttelevuus, ovat keskeisiä. Toimialan läsnäolon vahvistaminen alueella, myynnin helpottaminen (ml. vienti ulkomaille), digitaalisen infrastruktuurin parantaminen, verkottumismahdollisuuksien edistäminen ja verkkoyhteistyön tehostaminen muodostavat kokonaisvaltaisen vision IT-alan alueellisesta edistymisestä.

Acknowledgements

This work is part of the Lahti Software (A78785) project funded by Päijät-Hämeen Liitto. The aim of the project stemmed from the need to identify companies and experts in the area and to create a permanent community between companies in the field and experts in software engineering. The project serves as a starting point for identifying and bringing together the region's growing software ecosystem.

The project result validated this study of the area's information technology (IT) companies and experts, as well as their needs, and the Lahti Software Meetups concept, which brings the area's IT companies, students, researchers, and experts together. With the help of the information and networks obtained in the project, we can further develop the cooperation model and strengthen the visibility of Lahti as a vibrant and interesting university city of software engineering. Furthermore, we want to express our gratitude towards those professionals who took part to our surveys and interviews and shared their views and expertise with us.

Symbols and Abbreviations

AI	Artificial Intelligence
GDP	Gross Domestic Product
IT	Information Technology
ICT	Information and Communication Technology

Table of Contents

1 Introduction

Päijät-Häme is growing into a nationally significant producer of software engineering professionals. In this region, information technology (IT) has turned into a rapidly growing and innovative industry, currently employing over 1,000 professionals. According to Gartner (2023), IT covers ”the entire spectrum of technologies for information processing, including software, hardware, communications technologies, and related services. In general, IT does not include embedded technologies that do not generate data for enterprise use”. This term is often related to information and communication technology (ICT), which can be understood as ”all technical means used to handle information and facilitate communication. It includes both network and computer hardware, as well as their software” (Eurostat, 2016). In our report, we focus on the IT perspective of Päijät-Häme industry. The region is already home to important market players and has the potential to become a key region in the IT services landscape of Finland and develop further. IT industry in the region is no longer a niche sector; it is becoming more relevant and critical in many other areas.

Study programmes related to Computer Science and Software Engineering at local educational institutions have attracted over 1,000 applications from prospective students this year. Meanwhile, many companies continue to invest in IT education and training for their personnel to transform digitally with modern technologies. However, the positioning of IT experts and companies in the Lahti region has been rather fragmented. Information about operators in the area is incomplete, and experts in the field have very few and irregular networking events. Moreover, with growing digitisation and servitization, companies other than those in the IT field also need experts in this field.

At the same time, the IT industry in Päijät-Häme region still needs support in a few aspects, which we aim to identify. We invite you to have a look at this report, where, with the language of numbers and statements of industry experts, we will tell you what the industry is like, what its prospects and challenges are and why you should join it now.

2 Methodology

In our study, we used both primary and secondary data. Primary data were obtained by conducting two anonymous surveys among IT companies. The first survey was sent to the top 250 IT companies in Finland, which provided information regarding their activities and personnel in Päijät-Häme region. The second survey was sent to companies from Päijät-Häme region we classified as IT-related. In addition, we conducted qualitative interviews with a few leaders from the companies of Päijät-Häme region who wished to participate in our research discussion. Regarding the approach to data analysis, both quantitative and qualitative methods were applied.

2.1 Data sources

In our report, the following data sources were used:

2.1.1 Finnish Statistics Office 'Tilastokeskus'

The National Statistical Service comprises Statistics Finland and 12 other organisations, most of which are government agencies. Together, these organisations form the national statistical ecosystem of Finland. One of Statistics Finland's tasks is to manage and develop the activities of this statistical ecosystem. The authorities produce statistics in Finland on the data they possess and have collected for national and international use. From this source, we explored the data related to the number of IT companies and employees (including their genders), total size of labour market, purchasing power and gross domestic product (GDP) size.

2.1.2 Education Statistics Finland 'Vipunen'

Vipunen is the education administration's reporting portal. The Ministry of Education and Culture and the Finnish National Agency for Education are jointly responsible for its content. Vipunen's statistics are based on data and registers collected by Statistics Finland, the Ministry of Culture and Education and the Finnish National Agency for Education. From this portal, we analysed the data related to the number of candidates, students and graduates of IT study programmes in Päijät-Häme region.

2.1.3 Company Trade Register 'Vainu'

Vainu's business directory allows researchers to search over 9 million European companies, allowing interested organisations to generate more insights by providing them with real-time company data and segmentation. From this platform, we exported the list of companies in the region filtered by their area of activity, which allowed us to find contacts to IT-related companies we reached as part of our surveys.

2.1.4 Finnish Tax Office 'Vero'

Vero offers a search of fiscal data in the publicly available Statistical Database. From this source, we obtained the income related data we compared with neighbouring regions.

2.1.5 Surveys conducted among companies from the region

To explore the state of Päijät-Häme IT industry, we conducted two anonymous surveys among the companies from the sector identified in the trade register. Both surveys were conducted online and comprised self-completion sets of questions, which were posted via the Webropol platform; they were conducted between May and August 2023. The first survey, targeted at the biggest 250 IT companies in Finland, as listed by TIVI in the year 2022 based on the financial reports of 2021, was sent to 225 companies, of which 20 responded (response rate of 9%). The second survey was sent to 141 companies selected from Päijät-Häme region with profiles tagged as IT-related in the Vainu database, of which 36 responded (response rate of 25.5%).

2.1.6 Interviews with industry representatives

Among the survey participants, a few leaders from IT companies in Päijät-Häme region were willing to participate in online research discussions, which allowed us to collect their opinions and perspectives on the growing industry. Research interviews were conducted in August 2023.

2.2 Data analysis

Data from official sources were solicited from the Finnish Trade Register based on classification codes. The authors chose and quoted the latest available data on each category. Additional data from secondary sources, such as websites, external reports and brochures, were referred to whenever necessary. The survey data were developed in line with the aims

of the project and gaps in our current understanding of the IT industry in Päijät-Häme region. The analysis results and their interpretation were adopted by the research group by consensus.

3 ICT Market Landscape in Päijät-Häme

The IT community in Päijät-Häme is diverse. IT professionals can be found at small start-ups that are focused on IT services as well as mid-size organisations that are purely developing IT and tech solutions. In addition, IT and software experts are employed at companies that have a different focus and product orientation, with IT just being a part of their operations.

3.1 Size of companies

Most of the study participants were working at small and medium-sized companies at the time of the survey; only 2.9% of them were working for organisations with an employee strength of 31–50.

Table 1. Number of employees at IT companies (source: self-conducted survey)

Employees at the company	Percent
1–5	67.7%
6–15	23.5%
16–30	5.9%
31–50	2.9%
>51	0.0%

3.2 Business profile

As discovered in our survey, 85.3% of the responders were part of organisations which had IT as their core business, and only 14.7% worked at companies focusing on other fields.

3.3 Number of IT experts and their gender

In terms of the number of IT workers in Päijät-Häme, there are over 1,000 professionals and over 500 technicians. According to Statistics Finland (2023), technicians can be found in roles related to performing predefined duties in user support, network maintenance, web and systems operations. Professionals can independently deliver and create services in areas such as software and applications development, web and multimedia design, network and data analysis. Note that most of them are males; only 21% of the professionals and 23% of the

technicians are women. Therefore, to improve gender equality among the IT community, more emphasis needs to be placed on promoting IT-related development among females.

Table 2. Number of IT employees and gender structure in Päijät-Häme (source: Statistics Finland, 2020)

Level of expertise	Total	Males	Females
IT Professionals	1,165	914	251
IT Technicians	530	407	123

3.4 Core competencies and technological stack

IT experts in Päijät-Häme have broad competencies and work on miscellaneous tools. We identified technologies and toolset from the areas of software design and user experience, platform infrastructure, back-end and database programming, web development and multidevice computing. Figure 1 presents the word cloud of technologies and tools mentioned by our survey responders; the most frequently mentioned words (by more than 10% of the responders) were MS Azure, .Net, JavaScript, React, WordPress, Python, C#, Linux and PHP. Note that the most often mentioned stack was Microsoft Azure, used by over 30% of the responders. The languages of .Net and JavaScript were mentioned by nearly 20% responders, followed by React, WordPress and Python (mentioned by 15% responders). This proves that the IT community in Päijät-Häme already has a wide range of competencies. The technologies indicated by the responders were popular among IT organisations and had proven to be of the highest quality, efficiency and security. They helped organisations design and implement new products and concepts, including custom software development. This can be reflected in the following statement from an interviewee:

In the past I have heard from some of our prospects the old stereotype that companies from Helsinki are perceived as more experienced, or have stronger competencies. This is actually not the case, as we can deliver at the same level, we also have very experienced and professional teams, and we can compete on the cost, quality and agility of our implementations, as the companies from Helsinki region have much higher overheads and office expenses than we do.

Tomi Kaitarinne, Director – Business & Technology, Founding Partner at Kuuki

Figure 1. Technologies and tools reported by the respondents (source: self-conducted survey)

4 Päijät-Häme as an IT Region

The Finnish IT market is growing rapidly. Päijät-Häme region has advantages on the market compared to its neighbouring regions, such as closeness to capital area, substantial labour market, including IT professionals, and relatively favourable income-to-cost ratio. The region also has strong industry and business traditions, as mentioned by the following interviewee:

In Lahti region we have strong industrial traditions, there has been UPO, ASKO, ISKU. So education level in IT is still lagging behind. I hope that with new initiatives such as Kempower and LUT more of good is coming. We just need to promote it more all around Finland, make more awareness and events for IT industry.

Antti Suikkanen, Co-founder and CEO at Priorit.Io

In this section, we discuss the key macroeconomic parameters, as well as upcoming trends and improvement possibilities, in the region.

4.1 Macroeconomic indicators

Here, let us discuss the key macroeconomic indicators related to Päijät-Häme region compared to those key indicators in the six neighbouring regions of Uusimaa, Pirkanmaa, Central Finland, Kanta-Häme, Kymenlaakso and Southern Savonia.

Table 3. Size of labour market compared to neighbouring regions (source: Statistics Finland, 2021)

Region	Total
1. Uusimaa	802,986
2. Pirkanmaa	229,843
3. Central Finland	108,624
4. Päijät-Häme	80,363
5. Kanta-Häme	70,713
6. Kymenlaakso	62,028
7. Southern Savonia	49,623

In Päijät-Häme, there are over 80,000 employees. Especially when combined with a skillset and education, the workforce strength has the potential to become a key export value.

Table 4. Size of GDP compared to neighbouring regions (Source: Statistics Finland, 2020)

Region	Total at current prices, in millions
1. Uusimaa	€55,537
2. Pirkanmaa	€40,407
3. Central Finland	€35,557
4. Päijät-Häme	€33,090
5. Kanta-Häme	€35,862
6. Kymenlaakso	€41,978
7. Southern Savonia	€33,471

In terms of GDP, Päijät-Häme is still behind all its neighbouring regions. Therefore, it is important to seek development opportunities, which can also be achieved by defining its strategic focus directions. In the market that is currently undergoing intensive transformation and globalisation, the IT sector can strongly impact the evolution of Päijät-Häme economy and facilitate the growth of societal welfare.

Table 5. Income compared to neighbouring regions (source: Tax Office, 2021)

Region	Sum of taxable income
1. Uusimaa	€57,946,062,285
2. Pirkanmaa	€14,568,948,437
3. Central Finland	€6,970,920,344
4. Päijät-Häme	€5,422,418,230
5. Kanta-Häme	€4,608,256,596
6. Kymenlaakso	€4,319,096,244
7. Southern Savonia	€3,356,269,179

In terms of taxable income, Päijät-Häme region stands strong against its neighbours. This reflects a favourable situation when it comes to the costs and earnings of the inhabitants.

Table 6. The gross value added at basic prices compared to neighbouring regions (source: Statistics Finland, 2021)

Region	Gross value added at basic prices, in millions
Uusimaa	€85,664
Pirkanmaa	€19,232
Central Finland	€9,003
Päijät-Häme	€6,205
Kanta-Häme	€5,648
Kymenlaakso	€6,126
Southern Savonia	€4,079

In terms of the purchase power of Päijät-Häme, it is at a very competitive position towards its neighbouring regions. Our survey responders also mentioned that, according to them, a key advantage of Päijät-Häme is a very good price-to-cost ratio when it comes to everyday life finances. Lahti's location and urban environment can also be perceived as attractive, as stated by the following interviewees:

We have very competitive cost to earnings ratio. The costs are lower than in Metropolitan Area. We also have very diverse industry structure, there is many of good companies in classical heavy industry that IT companies can serve and support. LUT gives us good attention for the importance of IT education in Lahti area. There is plenty of students graduating that is boosting us opportunities, but many companies haven't noticed it yet.

Sampo Pilli-Sihvola, Director – Software Engineering at Peikko

Lahti is close to Helsinki and Vantaa Airport (…), it's not too crowded, but at the same time it has all the facilities that modern city should have.

Dr. Taras Zagibalov, Co-founder and CEO at Oppi.Ai

4.1 Upcoming tech trends

In our survey, we asked our responders about their perception of phenomena that would have the biggest impact on the IT business in Päijät-Häme in the upcoming years. Their responses reflected various perspectives on the growth and development of the region, the role of

education and technology, challenges and opportunities. Let us summarise their perspectives in the table below:

Table 7. Key upcoming trends at Päijät-Häme (source: self-conducted survey)

Theme	**Key Points**
Education and Labour Availability	- Perception of significant growth in education. - Anticipation of improved labour availability in the future. - Suggestion to continue and expand professional trainings.
Digitalisation and Start-ups	- Focus on promoting digitisation among customers. - Anticipation of start-up successes that may contribute to regional recognition.
AI and Innovativeness	- Interest in various AI solutions and their potential. - Acknowledgement of AI's positive impact and opportunities. - Focus on machine learning, neural networks and emerging tech solutions. - Growth of gaming industry in Lahti region. – Blend of culture and tech for innovative ideas.
IT Companies and Talent	- Interest in quantity and success of local IT companies. - Availability of skilled workers is crucial. - Desire for visible IT firms to foster good competition.
Collaboration and Education	- Importance of networking around major companies. - Advantages of modern education. - Role of universities and new social studies acknowledged.
Investment and Area's Attractiveness	- Interest in attracting larger companies to the region. - Closeness to Uusimaa for IT investment. - Emphasis on regional growth and overall appeal.
Remote Work and Sustainability	- Appreciation of remote work and rural employment opportunities. - Importance of area's appeal to be maintained to retain professionals.
Challenges and Concerns	- Concerns about economic recession impacting tech growth and innovativeness. - Mention of inadequate communications between cities in Päijät-Hame.

4.2 Room for improvement

We also asked our responders about the improvements required to support the IT business in Päijät-Häme. The responses from the survey highlighted various aspects of enhancing the region's growth and competitiveness. Emphasis was placed on leveraging the international

competitiveness of local companies through joint and collaborative projects. Networking emerged as a crucial factor for success, with a desire for a more visible IT ecosystem in the area. Suggestions were made for events, such as pitching sessions and partnership meetups, along with the need for improved access to decision makers. The importance of understanding digitalisation's potential in client companies was stressed, while the need to attract talent and increase visibility through marketing remained prominent.

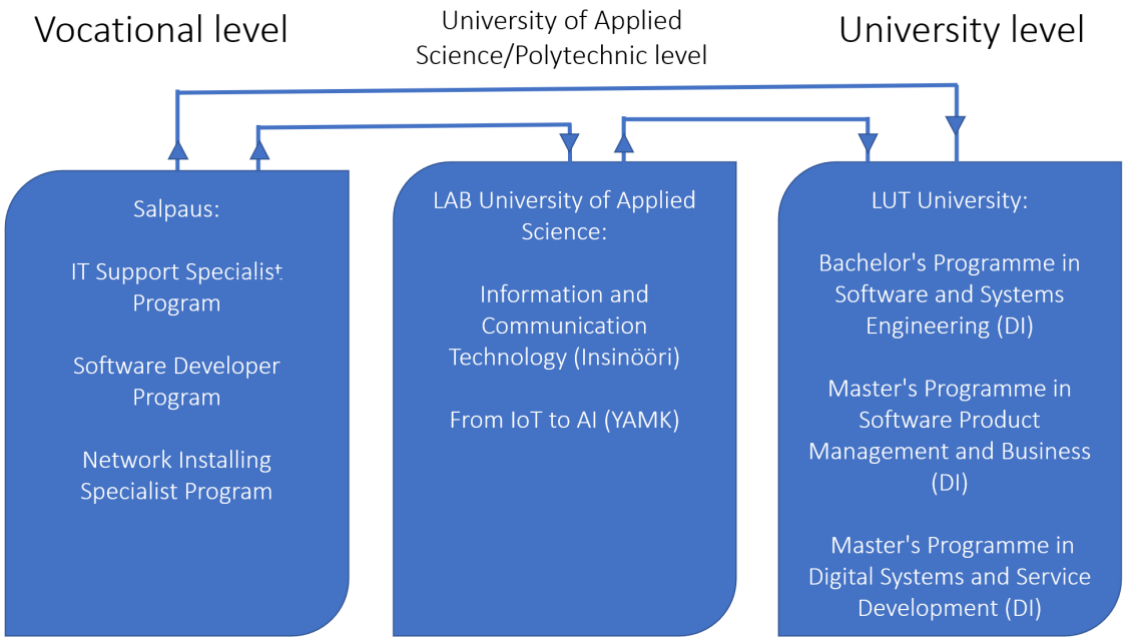
Table 8. Possible improvement areas for supporting IT businesses in Päijät-Häme

Response Themes	**Key Points**
Cooperation and Joint Projects	- Emphasis was placed on utilising the international competitiveness of regional companies. - The need for cooperation projects among companies was highlighted. - The importance of creating joint business initiatives was mentioned.
Networking Importance	- The vital role of networking was emphasised. - The need to build a visible IT ecosystem in the area was mentioned. - The importance of making international contact was emphasised.
Empowering Businesses and Digitalisation	- The need for large companies to facilitate subcontracting services was indicated. - The importance of increasing understanding of digitalisation possibilities in client companies was stressed
Events and Access to Decision Makers	- Activities such as pitching events and partnership meetups were suggested. - Assistance in accessing public decision makers was requested. - The value of networking events, particularly AI and security-related events, was emphasised. - Requirement of events driving engagement was mentioned.
Opportunities and Talent Attraction	- Satisfaction with current opportunities was expressed. - The focus on attracting talented individuals was underscored.
Visibility and Marketing	- The need for more visibility and marketing for Päijät-Häme was raised. - The desire for improved regional recognition was expressed.
Skills Development and Collaboration	- Collaboration with universities and industry professionals was mentioned. - The focus on skill development and collaboration was highlighted.

5 IT Education in Päijät-Häme

IT education opportunities in Päijät-Häme encompass a diverse range of programmes offered by institutions such as LUT University, LAB University of Applied Sciences and Salpaus Further Education (Illustration 1). The degree and non-degree programmes offer both theoretical and hands-on experience training to address practical challenges in their respective fields. These offerings make an attractive opportunity for both young persons entering the market and experienced professionals aiming to reskill and switch to IT careers.

Illustration 1: Local IT education providers and education paths



5.1 Degrees at LUT University

In this section, we summarise the educational opportunities in IT-related degrees at LUT University (available in English).

5.1.1 Bachelor's Programme in Software and Systems Engineering

The Bachelor's Programme in Software and Systems Engineering at LUT University equips students with the skills to develop innovative software solutions and manage complex systems. Designed to last around 3 years, this programme focuses on various aspects of

software engineering, including coding, system design and project management. Students engage in practical projects and gain experience through collaboration with industry partners. The programme emphasises teamwork, problem solving and critical thinking, enabling graduates to excel in the dynamic field of software engineering.

5.1.2 Master's Programme in Software Product Management and Business

LUT University's Master's Programme in Software Product Management and Business combines technical knowledge with a business perspective. Designed to last around 2 years, the programme is designed for those interested in managing software products through their lifecycle, from idea to market launch. Students are taught skills in product development, marketing and project management, being prepared to lead software product teams effectively. The curriculum includes case studies, real-world projects and industry collaborations, providing a holistic understanding of software product management. Graduates are well equipped to navigate the intersection of technology and business in the software industry.

5.1.3 Master's Programme in Digital Systems and Service Development

LUT University's Master's Programme in Digital Systems and Service Development is designed to equip students with the skills required to create innovative digital solutions and services. Designed to last around 2 years, this programme focuses on the intersection of technology and user-centric design, emphasising the development of digital systems that cater to user needs. Students learn to design and implement digital services while considering aspects such as user experience, usability and business relevance. The curriculum covers a wide range of topics, including software development, data analytics and service design. Through practical projects and industry collaborations, students gain hands-on experience and insights into the evolving landscape of digital technology and service development.

5.2 Degrees at LAB University of Applied Sciences

In this section, we summarise educational opportunities in IT-related degrees at LAB University of Applied Sciences (available in Finnish).

5.2.1 Master's Programme 'From IoT to AI'

The programme focuses on specialised professional studies, emphasising data measurement, analysis, visualisation and machine learning. The goal of the degree programme lasting around 2 years is to apply the opportunities created in the IT field to generate added value in the public sector, business and industry. The online-delivered programme deepens the understanding of Internet of Things (IoT), data analytics, machine learning and AI and enhances collaboration among various stakeholders. Learning opportunities encompass the latest trends in IT, from virtualisation to the utilisation of digital twins.

5.2.2 Bachelor's Programme in ICT (offered both in the Lahti Campus and online)

The primary focus of the ICT programme is on machine learning and AI, supported by software, IoT and computer networks. The studies designed to last 4 years can be completed online, allowing for location-independent learning, or onsite at the Lahti campus. In the field of media technology, the curriculum is aligned closely with the gaming industry, providing fundamental skills applicable to roles within the gaming sector. Software engineering concentrates on distributed web-based services, which have expanded to mobile and smart devices, necessitating consideration in design. The sensors used in smart and IoT devices enable the collection of novel data and the development of applications. This entails creating applications usable across different device platforms regardless of time and place, integrating a gaming-like approach to user experience to maintain high user engagement. Additionally, students can focus on back-end development, as these systems are essential for most services.

5.3 Degrees at Salpaus

In this section, we summarise the educational opportunities in IT-related basic vocational degrees (perustutkinto) at Salpaus (available in Finnish).

5.3.1 IT-tukihenkilö Koulutus (IT Support Specialist Programme)

The IT-tukihenkilö module at Salpaus Further Education offers a programme for IT support specialists, which provides students with skills in troubleshooting and resolving technical issues, maintaining computer systems and offering user support. It prepares graduates to work as essential contributors to efficient IT operations within organisations. The curriculum

covers various topics, including hardware and software support, network basics and customer service. Practical training and hands-on experience enhance students' ability to address real-world IT challenges.

5.3.2 Ohjelmistokehittäjä Koulutus (Software Developer Programme)

The Ohjelmistokehittäjä module focuses on training students to become skilled software developers. The programme equips students with the knowledge and practical skills required to design, develop and maintain software applications. The curriculum covers programming languages, software development methodologies and project management. Through hands-on projects and collaboration, students gain experience in creating software solutions to meet diverse needs.

5.3.3 Tietoverkkoasentaja Koulutus (Network Installing Specialist Programme)

The Tietoverkkoasentaja module is designed for students interested in becoming network installers. The programme offers comprehensive training in designing, installing and maintaining computer networks. Students learn about network components, configurations, security and troubleshooting. Practical training and real-world scenarios enable students to become proficient network installers capable of ensuring reliable network connectivity.

5.4 IT students in the region

The numbers of applicants and students of IT programmes in Päijät-Häme have been constantly growing recently. The number of applicants grew over 5 times in 3 years, and the number of persons who accepted a study place at the university almost doubled. More graduates and persons with IT competencies are strongly desired in the industry, as stated by one of our interviewees:

The lack of employees and best talents is still visible in Päijät-Häme (…). We need more international coding pool and experts in all areas, such as front and back end, UI/UX, as well as sales and marketing.

Antti Suikkanen, Co-founder and CEO at Priorit.Io

5.4.1 Applicants and accepted students

There has been a growth in the numbers of intake, selected and accepted students with IT degrees in university and university of applied sciences.

Table 9. Applicants and those who accepted an offer of admission for university and university of applied sciences of IT programmes in Päijät-Häme (source: Vipunen, 2023)

Year	Intake	All applicants	Selected	Accepted a study place
2020	188	1 818	300	255
2021	236	2 655	399	315
2022	223	2 895	510	369
2023	329	9 906	591	402

The number of persons who applied at adult educational institutions has been stable over the past few years.

Table 10. Applicants and those who accepted an offer of admission for adult education at all levels of IT programmes in Päijät-Häme (source: Vipunen, 2023)

Year	Intake	All applicants	Selected	Accepted a study place
2020	88	171	87	78
2021	75	201	81	75
2022	75	234	78	75
2023	75	234	78	75

Analysing the situation at the university of applied sciences, the numbers of new students and graduates have remained at similar levels over the past 3 years.

Table 11. New students, students and degrees in university of applied sciences in IT programmes in Päijät-Häme (source: Vipunen, 2023)

Year	New students	Students	Degrees awarded
2020	222	714	126
2021	216	720	102
2022	219	735	108

Despite the steady growth in the number of students at universities in IT programmes in Päijät-Häme, the number of graduates has remained low. Nonetheless, according to the currently accepted and studying persons, the number of graduates in the upcoming years will also start to grow rapidly.

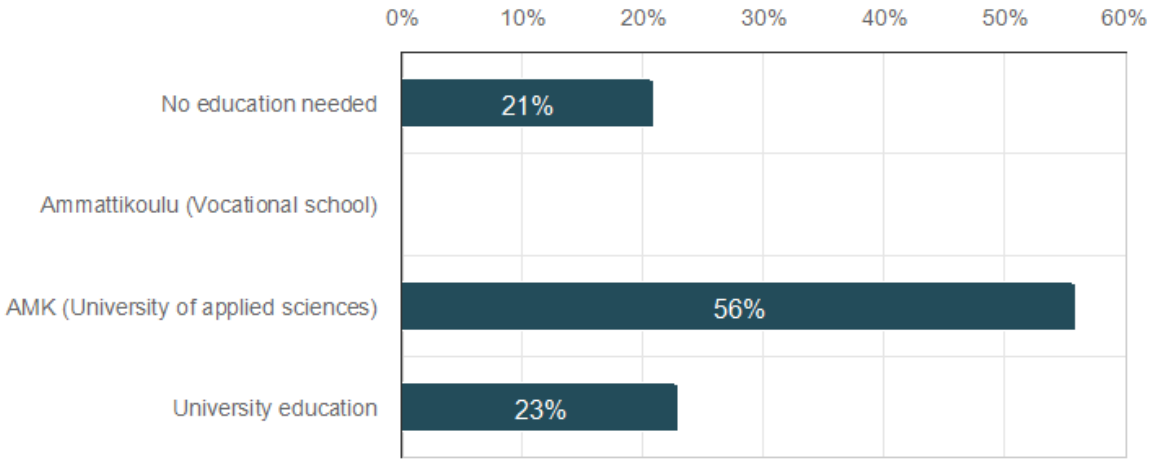
Table 12. New students, students and degrees in universities in IT programmes in Päijät-Häme (source: Vipunen, 2023)

Year	New students	Students	Degrees awarded
2021	93	126	*no data available*
2022	129	255	9
Total	222	381	9

5.5 Industry perspective

In terms of the educational needs of job candidates, the survey highlighted companies' preference for higher education graduates, with surveyed firms seeking those with at least a bachelor's degree. The respondents also valued practical experience and competencies in candidates. As part of our survey, we asked about the education level at which the companies are mostly seeking new recruits. As discovered, most of our responders searched for graduates of higher education, with either a degree of university or that of university of applied sciences.

Figure 2. Education levels required for recruitment by companies from Päijät-Häme (source: self-conducted survey)



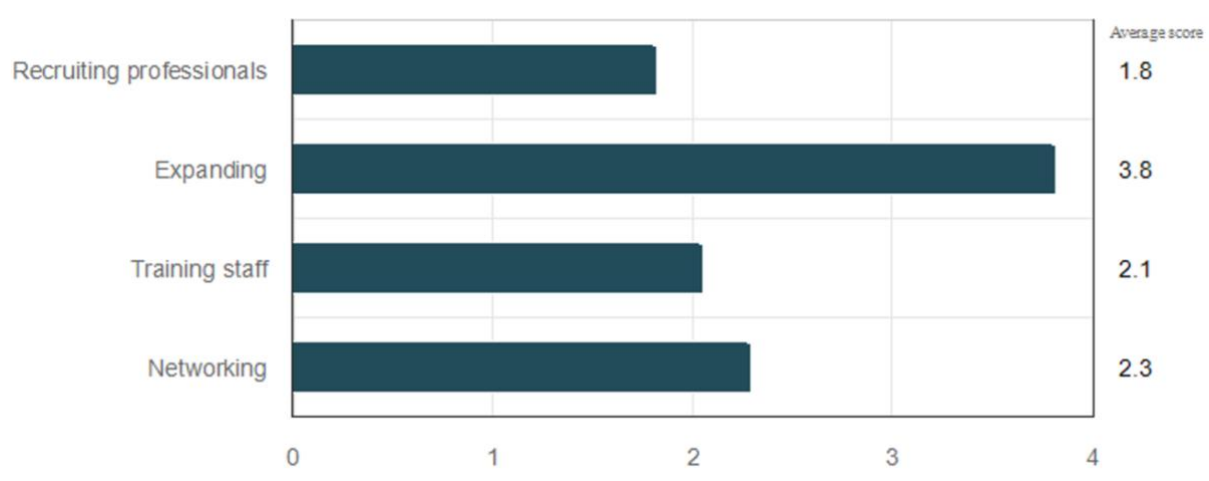
6 Positioning of IT Companies in Päijät-Häme

In this section, we will summarise our findings regarding setup, internalisation, focus areas, mode of working and the key challenges of IT companies in Päijät-Häme.

6.1 Setup, internationalisation and focus areas

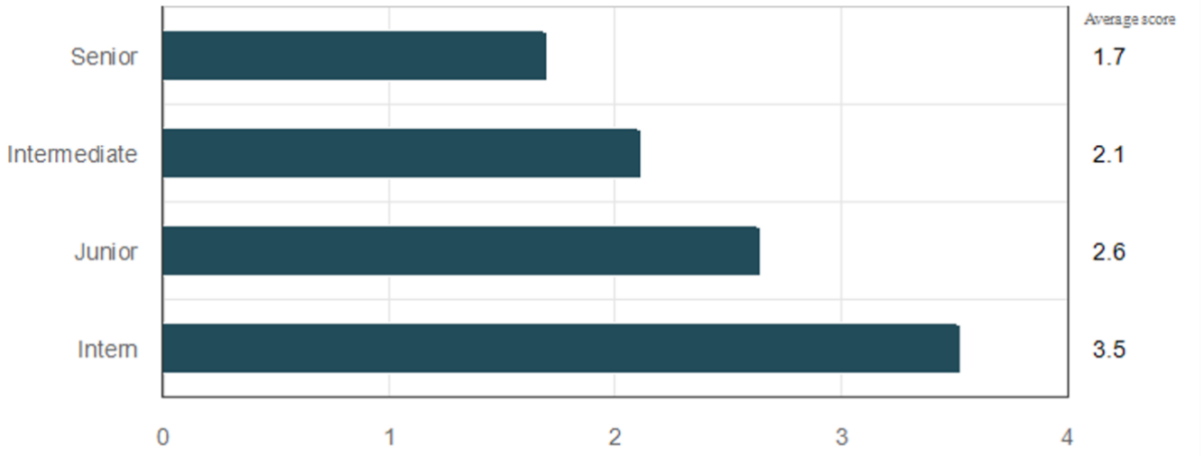
As identified in our survey, the highest priority for the responders was their business expansion. This was followed by networking (i.e. finding correct contacts and business partners), training of professional staff and finally recruitment.

Figure 3. Priorities for companies from the first survey (source: self-conducted survey)



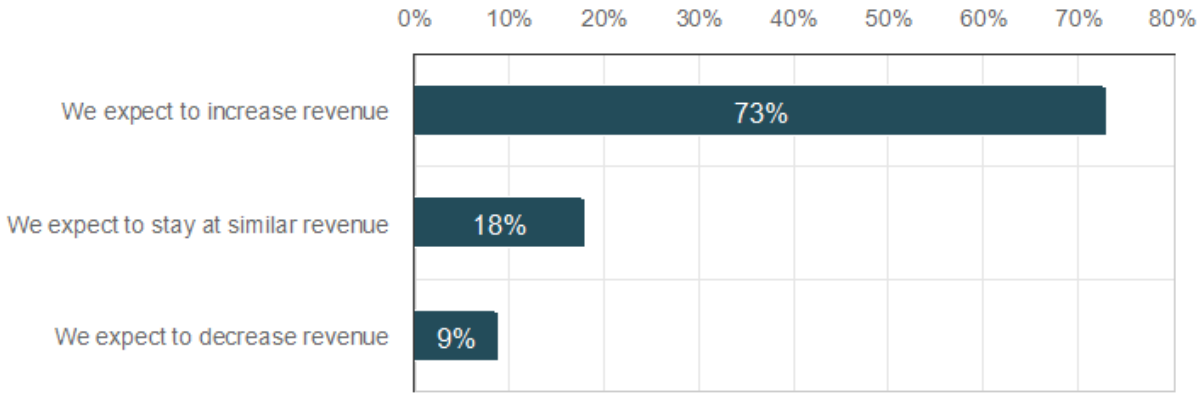
In terms of the current state of the employed professionals, most of our responders were interns and juniors, few were intermediate experts and even fewer seniors. This indicates that the industry is still growing and is based on a large number of persons who have recently started their journey in the IT industry.

Figure 4. Workers' position levels at IT companies (source: self-conducted survey)



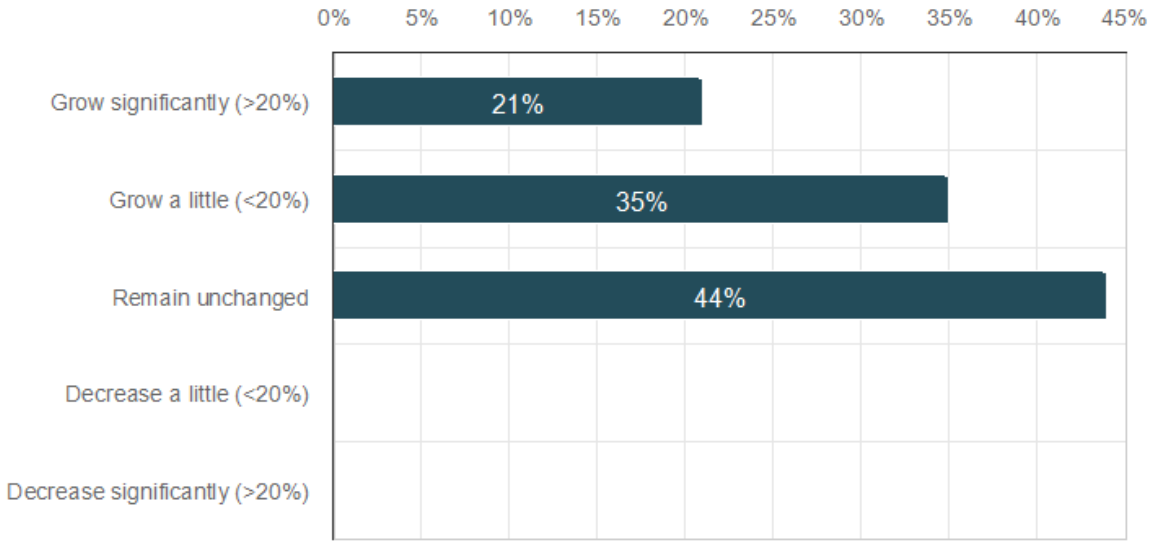
Most of the responders expected to increase revenue in the next two years. Only a few expected its decrease, and 18% expected to stay at a similar level. This proves that the industry is ambitious and has high targets for sales and business growth.

Figure 5. Revenue forecast (source: self-conducted survey)



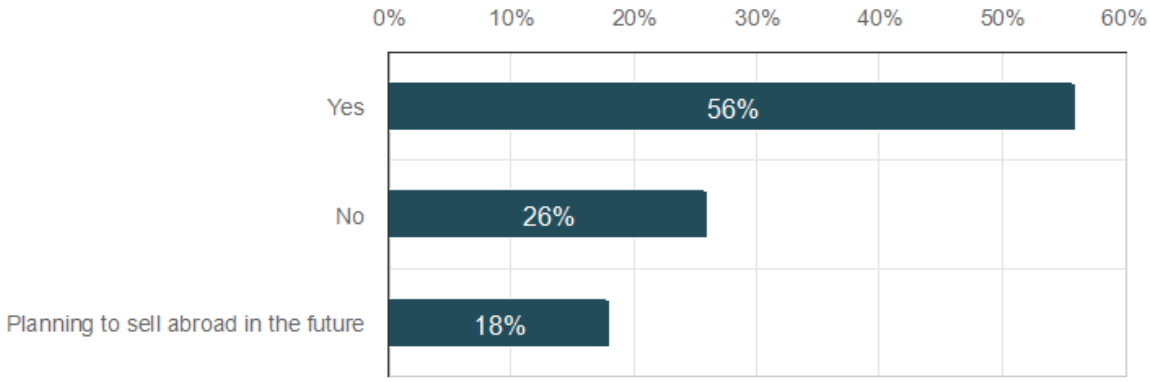
Note here that most of our responders did not aim to grow or decrease the number of IT professionals. Their company's headcount of the IT experts in the next two years was planned to remain unchanged. The majority of respondents, though, aimed to grow their IT workforce: either significantly (21%), or at least a little (35%).

Figure 6. Plans of growing IT workforce in the next two years (source: self-conducted survey)



Most respondents (i.e. over 50%) stated that they were already selling their products or services outside of Finland. Moreover, 18% of them had plans for the future. Only 26% of the responders had not been selling outside of Finland yet. This is a good indicator of international presence of the companies from this region and ambitious goals for the future in this respect.

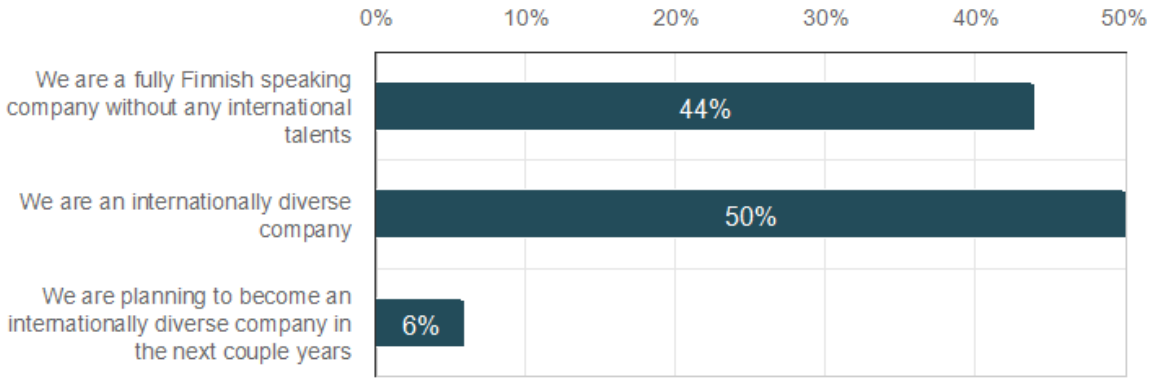
Figure 7. Selling abroad (source: self-conducted survey)



Studying the ethnic workforce of our responders, the majority was internationally diverse, representing various backgrounds. Additionally, a few responders planned to transition into

a more internationally diverse company in the upcoming years, and nearly half of them were fully Finnish speaking, without international talents.

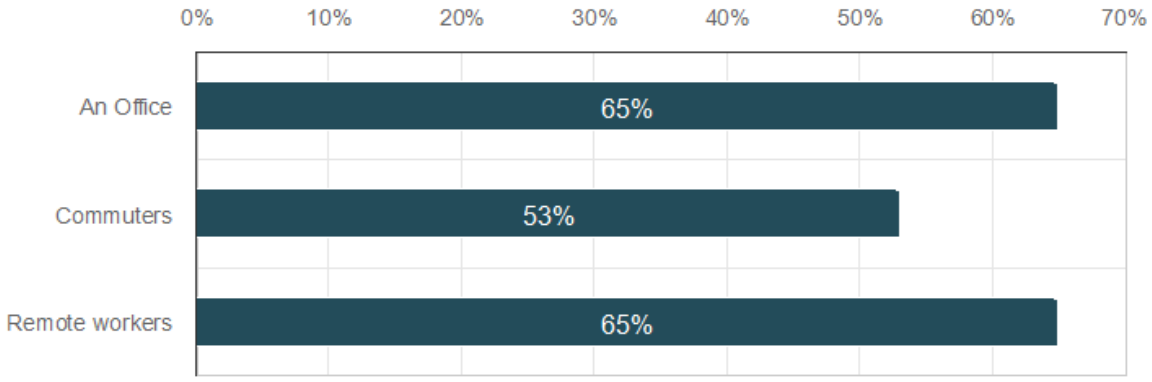
Figure 8. Internationalisation (source: self-conducted survey)



6.2 Mode of working

Most of our responders had an office in Päijät-Häme; some of them were remote workers and the so-called 'commuters' (persons who would travel to the office to perform their duties but have their homes at some other town/location).

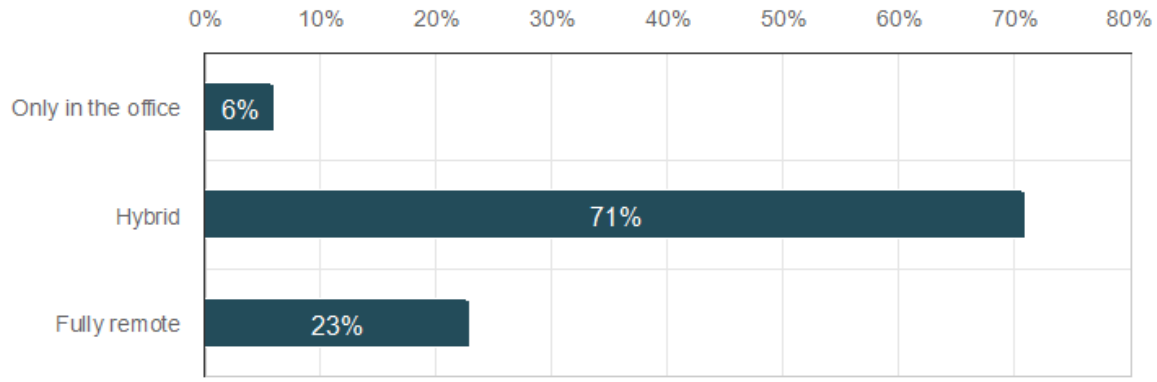
Figure 9. Working presence (source: self-conducted survey)



Note that 62% of our responders did not have a reserved space for commuters/remote workers in Päijät-Häme. Only 38% had workspaces for them, which indicates that companies are rather prepared and used to situations where not every employee would always have a place to sit when they come to work.

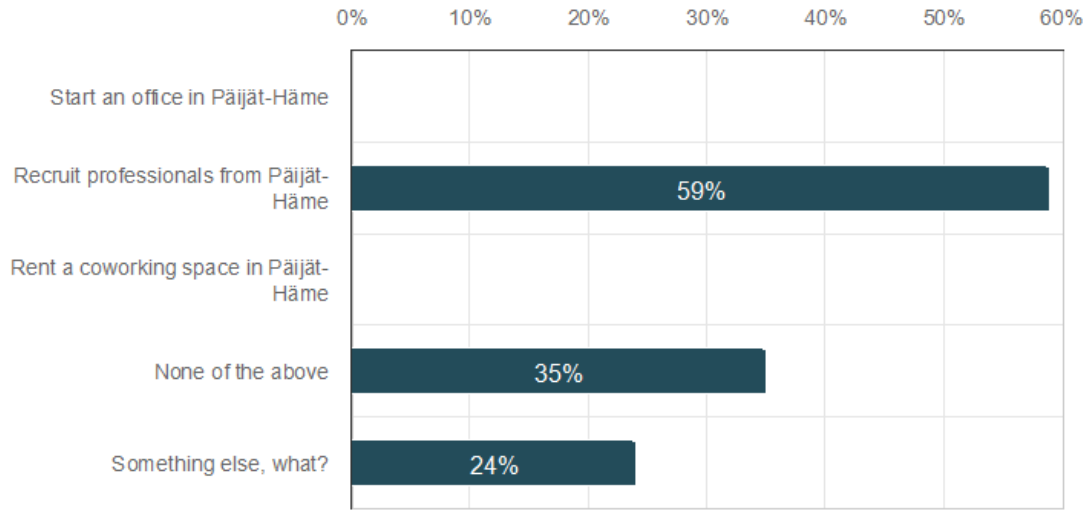
Only a few percentage of respondents indicated that the company followed the 'only in the office' model. Over 70% of the respondents stated that they worked in a hybrid mode, and over 20% stated that they had been working fully remote. This means that the industry has been transitioning onto a more flexible approach, and the remote tendency is clearly visible.

Figure 10. Working model (source: self-conducted survey)



None of our responders from the first survey planned to start an office in Päijät-Häme. Instead, the majority (59%) aimed to recruit professionals from this region. Some respondents also indicated that they had been aiming to recruit professionals from the other regions of Finland.

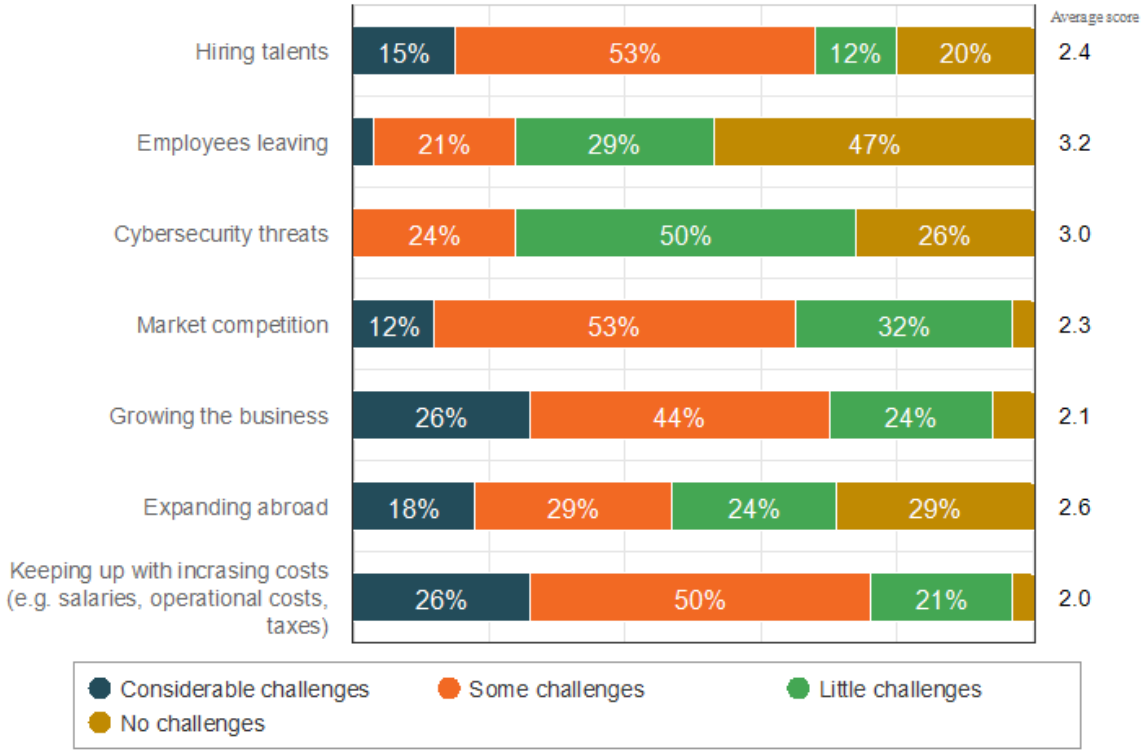
Figure 11. Plans related to office space (source: self-conducted survey)



6.3 Challenges

Our survey revealed a spectrum of challenges that the companies faced in their business activities. Finding and hiring talents emerged as a notable concern, with the majority perceiving it as a challenge. Employee leaving was viewed as a less significant challenge. Cybersecurity threats were identified as a concern by a significant portion of respondents, and market competition was seen as a challenge by the majority. Growing business and expanding abroad presented substantial challenges for a considerable portion of the participants. Managing increasing costs, including salaries and operational expenses, was viewed as a concern by many, although a smaller group perceived no challenges in this regard. These findings underscore the multifaceted nature of the challenges that regional companies encounter in their endeavours.

Figure 12. Challenging areas (source: self-conducted survey)



Our survey also uncovered some challenges with recruitments among responders, as summarised in the table below. This was also referred to by one of our interviewees:

Lahti is not yet too appealing for IT workers, as there is no community around IT development, like in other cities. And we didn't yet have any big player in Lahti area, such as Nokia has been in Espoo. Technology-wise, I think that technology-oriented companies

like Kempower can help it happen. Nonetheless, we need stronger building of IT hub, together with institutions like LUT and Ladec that would make it possible for companies to connect and build the IT future together. We need to constantly challenge ourselves and try find our new strategic focus, so that we can have in the future some famous technological innovation or service that would be the label or specialty of Lahti, and all the companies can build an ecosystem around it.

Sampo Pilli-Sihvola, Director – Software Engineering at Peikko

Table 13. Recruitment challenges (source: self-conducted survey)

Challenges	**Key Points**
Technical and Business Expertise Needed	- Demand for senior-level developers for technical architecture of software. - Need for developers/product managers with strong business understanding. - Requirement for expert sales employees to drive business growth. - Emphasis on senior-level cloud proficiency (development, management). - Demand for senior consultants with industry experience, automation experts and integration design specialists (Microsoft products). - Need for professionals skilled in UX/UI and full stack development. - Demand for experienced developers in embedded systems with strong user interface skills (Linux environments). - Scarcity of C# experts for 3D modelling software plugins. - Logic programming skills for systems like Siemens and Schneider in demand.
Synergies between IT & Business	- IT professionals should understand both technical and business operations. - Enhanced business understanding improves the effectiveness of developed solutions. - Senior programmers need technical and leadership skills.
Resource Availability	- Limited resource availability for recruitment in new enterprises. - Sole proprietorships often have sufficient resources within existing business models.

Other Aspects	- Some companies operate as one-person entities and do not wish to recruit anyone. - Financial constraints in hiring additional personnel were mentioned.

Our survey uncovered the operational challenges of the IT companies in Päijät-Häme region, summarised in the following table. One aspect mentioned by our interviewee was also directly related to community building:

We need more cooperation and mutual support between companies. Informal meetings for building community, such as Software Meetups I participated at this year, or more events such as the upcoming Lahti Software Day would help a lot. This was the first time in many years at the Meetup that I have seen where companies meet together, discuss their experiences and build good relations, not just thinking of each other as competitors. It's changing the attitude and can help us build a lot together in the future.

Tomi Kaitarinne, Director – Business & Technology, Founding Partner at Kuuki

Table 14. Operational challenges (source: self-conducted survey)

Challenge	**Summary**
Attractiveness & Salaries	Issue of the region's perceived unattractiveness and lower salaries compared to other areas, making it harder to hire skilled workers despite lower living costs.
Client Reach & Infrastructure	Challenges include limited client access, collaboration with universities, infrastructure conditions and potential subsidies.
Lack of Prominent Employers	Region lacks major companies to work at, making it less appealing to potential talent.
Location-based Issues	Geographical location poses challenges for talent attraction and client engagement.
Reputation & Perception	Challenges stem from the region's reputation more for industry than software, affecting its appeal to software engineers.
Education & Expert Shortage	Scarcity of education and engineering resources compared to other areas hinders regional growth.
Cost & Funding Hurdles	Difficulties in cost and funding, especially for new companies, compounded by lack of support network for entrepreneurship.

Dependency on Capital	Challenge arises from a significant customer base in the capital, requiring planned visits and adding complexity to operations.

In the final section of our work, we synthesise the areas in which the studied companies need help or support in the future to be successful at the market. As stated by one of our interlocutors, internationalisation, migration support and information about business establishment are of high importance:

''I think that local businesses and local community should work together to act as more international businesses environment, it might be helpful to have more information regarding immigration and setting up businesses for those who just migrated into this area and to Finland in general.''

Dr. Taras Zagibalov, Co-founder and CEO at Oppi.Ai

Table 15. Needs for support (source: self-conducted survey)

Support Needed	**Summary**
Improving Business Models and Technology Use	There is a clear need for help in making business models better with technology. This also involves creating new ways of doing business with companies. This includes using new technology to make business better and forming important partnerships.
Connecting and Creating Value	Responders expressed the need for help with making connections, creating chains of value and organising financing rounds. They think it is important to work together, make chains of value stronger and enhance access to investment money. They suggest organising events for connecting, building partnerships and providing financial advice to make businesses better and manage money streams. It was suggested to create programmes in which experienced people help new businesses, places for new businesses to grow and events where they can meet others.
Working Together on Research	Responders require support for working together on research initiatives. They think it is important to have joint projects where they can work together with educational institutions on research. They suggested agreements to work together and projects that help share knowledge and new ideas through research .

Getting and Developing Employees	Responders need help finding and training good employees. They know it is important to have skilled people to help them grow. They suggested programmes to find skilled people, training opportunities and ways to help people improve their skills. This makes businesses better and meets the needs of the industry.
Guiding Skills and Internships	Responders need help guiding skills in which they are needed and organising internships. They say it is important to match skills with what businesses need and give people real experience. They suggest projects to map skills, programmes for internships and thesis workers and coordination to improve skills. This helps businesses find the right skills and people to be ready to work.

7 Conclusions

Päijät-Häme has been facing a dynamic transformation towards becoming an IT hub of the future. In his section, we summarise our key findings related to the current state of the IT industry in Päijät-Häme.

Stipulated by the forecasted growth of IT professionals educated at local institutions in upcoming years, the region stands in front of the opportunity to take advantage of this rapidly growing industry that can influence the local economy and society. With Päijät-Häme staying behind neighbouring regions in terms of GDP, the growth of IT sector creates strategic opportunities for future development directions. The IT sector, in a time of intense transformation and globalisation, can play a pivotal role in elevating the region's economy and societal welfare. The region's competitive purchasing power, especially when compared to neighbouring areas, underscores its cost-efficiency advantages. The rise in student enrolment in IT programmes is promising, and an increased number of graduates is eagerly anticipated. The expertise within the local IT industry is broad and diverse, indicating a wide range of competencies. The technologies used by respondents hold significance in IT organisations for their quality, efficiency and security, facilitating product and concept development.

The challenges for IT companies in the region are multifaceted. These encompass attractiveness and salary levels in comparison to other growth centres, limited client reach, infrastructure conditions and the absence of prominent employers. Additionally, geographical proximity, reputation and resource constraints present hurdles to growth. Moreover, gender equality within the IT community in Päijät-Häme requires an effort to promote ICT-related development among females. In the recruitment landscape, numerous challenges were unveiled. Talent acquisition remains a major concern, with the need for specialised skills and a shortage of experts in certain domains complicating the process. Skills and training challenges encompass the scarcity of professionals skilled in specific areas, including UX/UI and programming languages. Business understanding is a significant expectation, requiring IT professionals to navigate both technical intricacies and business operations.

While this study offers valuable insights, it is important to acknowledge its limitations. The findings are based on survey responses from a specific subset of companies, which may

not fully represent the entire spectrum of the current state of IT industry. Furthermore, with the study's focus on primary data, we reached only a limited number of responders, and a larger sample could provide a more comprehensive view. As with any study, the dynamic nature of the industry and region means that conditions and challenges can evolve over time. Hence, repeating the study regularly, probably by exploring other/new facets, would certainly bring value in the future.

Despite these limitations, the identified needs for support among companies underscore the importance of enhancing operating models through technology, fostering collaborations and optimising value chains. Collaborative research and customer insights also hold key positions alongside talent acquisition and development efforts. Start-up assistance, educational collaborations, global marketing and tailored training programmes emerge as essential avenues for nurturing growth. In essence, by strategically addressing the challenges and embracing the support opportunities identified, the IT community in Päijät-Häme can work towards fostering regional growth, economic advancement and overall prosperity. Let us summarize the state of IT Industry in Päijät-Häme in 2023 at Illustration 2.

Illustration 2. Summary of IT Industry in Päijät-Häme in 2023

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Appendix 1. Research interview questionnaire

I. Introduction to the research goals and the researchers
II. We aim to explore the 'IT industry in Päijät-Häme'
III. Are there any questions regarding the research?
IV. Ask permission and start recording.
V. Note: The recordings will be used for research purposes only (non-commercial) and stored on LUT servers; if you wish, your company names or identities will be eliminated.

a) *Your professional and educational background.*
b) *How long have you been working at your current company? How many years of work experience do you have in total?*
c) *What are your services/technologies and areas of specialisation?*
d) *What is your company's number of employees and business activity/revenue size?*

1. What are the key benefits for IT companies in Päijät-Häme?
2. What are the key risks for IT companies in Päijät-Häme?
3. What are the key challenges for IT companies in Päijät-Häme?
4. Please tell what key areas your company needs help with?

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