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Towards Modern Public Employment Services: Investigating the Needs of Job Seekers and Organizations

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Author’s Declaration of Originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature, and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

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Abstract

Over time, labour markets become susceptible to change as a result of technological advancements, economic downturns, pandemics, and natural disasters. It is a widely acknowledged fact that as new professions arise, some occupations see a decline in public demand. It has become the responsibility of governance to identify the future demand for professions and prepare the workforce accordingly in order to maintain a sustainable and a stable economy. It is necessary to equip people with the knowledge and skills that will be in demand in the future, and it is equally important to ensure that those who work in less demanding professions have a secure future. This will have an indirect impact on the nation's unemployment rate and political decision-making in areas like education, immigration, labour legislation, and funding.

Public Employment Services (PES) have been developed with the intention of connecting professions and skills in order to give suggestions to people for upskilling and reskilling for future skills demands taking into account their talents, interests, and opportunities. Different projects have been launched at both the national and EU levels, and they are continually being enhanced with the help of research and analysis.

To determine the opportunities and consumer expectations for the future development of such PES systems, this thesis considered the e-tootukassa, the Public Employment Services (PES) available in Estonia as an example use case. Based on the findings of the study, the author has created guidelines for streamlining the environment for training recommendations for upskilling and reskilling. Success factors of the Public Employment Services (PES) ecosystem based on consumer demand from the standpoint of job seekers and employers in a labour market are identified and presented in the recommendations sub-chapter.

This thesis is written in English and is 103 pages long, including 6 chapters, 18 figures, and 6 tables.

Keywords: Public Employment Services (PES), Artificial Intelligence (AI), public sector innovation, upskilling, reskilling, unemployment, e-tootukassa, self-service, service design

List of abbreviations and terms

1	VCA	Virtual Competence Assistance
2	ILO	International Labour Organization
3	OSKA	Labour market Monitoring and Future Skills Forecasting System
4	ICT / IT	Information and Communication Technology / Information Technology
5	ISCO	International Standard Classification of Occupations
6	ESCO	European Skills, Competences, Qualifications, and Occupations
7	EU	European Union
8	US	United Sates
9	AI	Artificial Intelligence
10	O*NET	The Occupational Information Network
11	SSYK	Standard Swedish Occupational Classification
12	LMI	Labour market intelligence
13	RQ	Research Question
14	SQ	Sub Question
15	TRA	Theory of Reasoned Action
16	TPB	Theory of Planned Behaviour
17	TAM	Technology Acceptance Model
18	UTAUT	Unified Theory of Acceptance and Use of Technology
19	EUIF	Estonian Unemployment Insurance Fund.
20	HR	Human Resources
21	AML	Anti-Money Laundering
22	EURES	European Employment Services
23	EURAXESS	Platform for researchers, entrepreneurs, universities and businesses to interact with each other
24	OECD	Organization for Economic Cooperation and Development
25	CRUD	Create, Read, Update, and Delete

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1. Introduction

1.1. Background

Labour markets are subject to changes over time continuously responding to industrial revolutions, economic downfalls, pandemics, natural disasters, or technology evolutions. Revolutions happening in the labour market affect not only the social security or the poverty of a country but also the entire economy locally and globally. For example, the COVID-19 pandemic has done a significant influence on the consumption, service, and hospitality sectors, financial sector, real estate, and investments sectors putting the job security of the industries in danger causing massive social-economic panicking [1][2]. The International Labour Organization (ILO) presents that around 436 million enterprises in the hardest affected sectors globally have been facing high risks of serious disruption due to the COVID-19 pandemic and half of these close to 232 million are in the wholesale and retail sale sectors [3]. Also, according to the ILO, the most vulnerable to disruptions are the informal economy workers in the labour market which is almost 1.6 billion globally [3]. The poverty level in Europe and Central Asia has increased from 34% to 80% during the first month of the pandemic [3]. The analysis shows how the pandemic situation has affected global socioeconomic well-being highlighting the least and most affected industry sectors leading to recognizing the trends in the job market that can open in the near future [3]. Despite the fact of massive socioeconomic disruption of any significant disaster, it is also noticeable that the recovery generates a lot of new opportunities for society [4]. Taking the post-COVID-19 factors into account, it is observable that consumer attitudes and marketing channels have been subjected to changes and society has adopted web-based business, shopping, automation, and digitalization more than in the pre-COVID-19 days [5]. The economic impact of the pandemic is bi-directional which creates both supply and demand effects [2]. A study done in Romania in forecasting unemployment in the pandemic crisis shows that even though the unemployment rate has increased at the beginning of the crisis, it has shown a decreasing trend during the recovery phases but with the risk of incurring prominent inequalities in the labour market [6].

In its Future of Jobs Report 2020, the World Economic Forum predicted that half of the labour force globally would have to undergo reskilling by 2025 [7]. Prior to COVID-19, the

emergence of automation and new technologies drastically altered the nature of the workforce, necessitating a critical need for extensive upskilling and reskilling. The importance of this need has increased recently. Experts predicted that 65% of young people entering primary school now would eventually work in entirely new professions categories that do not currently exist in 2016 World Economic Forum research [8]. It conveys an alert about the importance it is to predict future labour market changes and providing workers with the skills they need to meet future job needs.

1.2. Purpose and Importance

One of the key activities in a country's goal of economic growth has been highlighted as detecting skill shortages and offering the workforce the necessary training. Producing a futuristic labour force is well recognized in policy-making and hence, in the digital agenda of Estonia, OSKA is a Labour market Monitoring and Future Skills Forecasting System managed under the Ministry of Education and Research which has been implemented to monitor and forecast the necessity of different skills in the coming future [9] and decision-makers utilize these statistics when making decisions about higher education, career training, immigration rules, and numerous other topics. According to the OSKA forecast, the ICT sector shows a significant necessity for skills by the year 2027 in Estonia, Additionally, it states that by 2027, the demand for routine jobs will decline while the number of complex jobs performed by specialists will rise [9]. ISCO (International Standard Classification of Occupations) is an occupational classification framework in which the ILO holds the authority, and this framework provides occupation classifications and skills mapping which could be used as a basis for the international reporting, comparison, and exchange of statistical and administrative data about occupations, as a model for the development of regional and national occupation classifications and as a system that can be directly adopted by the countries which haven't introduced their own national classifications [10]. ESCO (European Skills, Competences, Qualifications, and Occupations) is a similar occupational classification and skill mapping framework developed into the European context which intends to map with the ISCO framework as well. The current version of the ESCO framework (V1.0) is available in 23 official EU languages plus Arabic, Icelandic, and Norwegian languages and contains approximately around 3000 occupations, skills, or competencies of around 13500 and qualifications of around 11500 [11]. The ESCO

framework is structured in three pillars occupations, skills/competence, and qualifications. The occupation structure is based on the ISCO classification framework. Not availability of the futuristic demand of skills should be improved in the ISCO framework and hence the ESCO framework shows a gap in improving the skills classifications module in the ESCO framework. As a result, in addition to the ESCO, OSKA study generates future skill demands in Estonia using qualitative expert judgment and estimations [9].

Public employment services (PES) are the authorities that facilitate the integration of job seekers and employers in EU countries. According to Hansen and Price, the four primary responsibilities of PES are: (i) job broking; (ii) delivering labour market information (LMI); (iii) managing programs for labour market adjustment; and (iv) managing unemployment benefits [12]. Although they are organized differently in each country, PES at the local, national, and European levels all work to reconcile the supply and demand in the labour market [13]. Eesti Tootukassa is the Estonian Unemployment Insurance Fund (EUIF) which is the PES in Estonia and Europass (EU), EURES (EU), and EURAXESS (EU) including Tootukassa are the most popular Public Employment Services (PES) in Estonia which connect candidates with job opportunities and training modules. Europass (EU) and Tootukassa (Estonia) are focusing on the recommendation of both job and training opportunities while EURES (EU) is focused only on job recommendation rather than providing training opportunities. EURAXESS (EU) is a platform designed to bring researchers, entrepreneurs, and universities together in collaborative research and development projects.

People naturally prioritize switching and upgrading their jobs, but they tend to exhibit less interest in skill development until it becomes required by the labour market. In the Peer PES paper-Estonia presented in the European Commission Mutual Learning Programme for Public Employment Services in 2012, says outdated qualifications are one of the biggest challenges to overcome (regardless of the level of they were obtained 30–40 years ago and no specific additional training has been present) and a majority of older workers tend to have worked for the same employer for a long time (in some cases their entire career), which makes them less competitive in terms of job search, skills and their willingness to change careers [14]. Understanding the size of the low-skilled adult population and recognizing the potential for upskilling and reskilling has received attention as a vital element for creating and executing efficient upskilling paths for individuals who are in need [15].

The main purpose of the skill classification by Artificial Intelligence (AI) supported PES self-service solutions is to match candidates and job opportunities for the purpose of preparing the workforce for upcoming skill demands in the labour market and, encourage people to engage in training modules to upskill and reskill themselves to make them secure and competitive in the labour market. The main objective of skill mapping in PES is to predict and educate people about demanding competencies and recommend suitable training modules which match their competencies, interests, and opportunities in the market.

The expected outcome of this study is to identify the challenges and provide recommendations to simplify upskilling and reskilling training recommendations ecosystems by investigating the needs of job seekers and employers (hereinafter referred to as "PES clients"). It is also intended to identify the public awareness level of PES digital self-service provision and to identify the public readiness towards using similar career support services. It is also intended to identify the challenges that PES self-service clients face in currently available solutions and to compile their expectations which can be used to improve the solutions further. In order to determine the aspects that will influence the design and growth of the PES solutions, the trends and characteristics of the current labour market have been investigated as the final component of this study.

Beneficiaries of this research will be all the stakeholders who are concerned by the ESCO classification outlined in the European Commission ‘joinup’ program as public and private employment services, Implementers of ESCO such as Europass and Tootukassa, social partners, sector skill councils, national education, training and qualifications authorities, human resource management, recruitment, and career guidance professionals, statistical and research organizations, promoters of the taxonomies and classification systems and international organizations such as ILO and the OECD [11]. In addition to the stakeholders mentioned above, it should be highlighted that the ultimate benefit of the development projects that takes any input from this intended study will be provided to the public by empowering people with futuristic skills and competencies.

1.3. Research Problem

Identifying skill gaps in the labour market and producing a futuristic workforce is one of the main activities in a country's vision of economic growth. To support this mission, the development of Public Employment Services (PES) self-service projects has been introduced and are continuously being improved. Examples of PES that have been initiated in Europe are NAV-Norwegian Directorate of Labour and Welfare, VDAB-The Public Employment Service of Flanders (In Belgium), STAR-Denmark, UWV-Netherlands, Employment Service of Slovenia (ESS) and Bundesagentur fur Arbeit (BA) in Germany [16]. It is important fact to study how these PES solutions can be improved further to achieve their maximum productivity by producing the skill requirements predicted to match the future labour market demands.

Even though there have been a lot of studies done on the technical side, there is a research gap when it comes to figuring out what the labour market's demands are for PES enhancement. It is identified that research is necessary to find out the expectations of job seekers and employers from a PES self-service digital solution and the challenges they face in currently available solutions to come up with recommendations to improve and simplify the PES ecosystem further.

1.4. Research Goal

The goal of this research is to identify the requirements of modern career support services publicly available to citizens (Public Employment Services-PES).

To achieve this, it is intended to find out currently available solutions at the European Union level and national level in Estonia. Expectations of people and challenges of current solutions will be studied for the purpose of identifying the gaps to be improved in the current solutions.

As the final part of the study, significant trends and characteristics visible among the workforce in the labour market will be studied for the purpose of providing insights into PES solution design and improvement.

1.5. Research Question

In order to achieve the goal of the study as mentioned above, the research question emerged as,

How to identify the requirements of modern career support services?

To develop the hypothesis and make the study actionable, the main research question has been broken down into more specific sub-questions.

SQ1: What is the level of awareness and utilization of digital public employment self-services among people living in Estonia?

This question aims to study publicly available solutions that assist people with employment recommendations and direct people toward upskilling and reskilling aiming to fill the gaps in the labour market demands. The study has been narrowed down to the services available in Europe Union and, Estonia and has been taken as the example for the case study. The awareness level of the general community about available digital PES self-service solutions will also be studied as a part of this question.

SQ2: What are the challenges job seekers face to use Digital Public Employment Self-Services (PES) available in Estonia?

This question aims to find out the challenges which job seekers face in currently available public employment services in Estonia.

SQ3: What are the expectations of job seekers and employers from digital Public Employment Services?

Supporting sub-question 2, sub-question 3 aims to find out what employers and job seekers are expecting in order to support current PES clients to overcome challenges and improve the solutions that are already in place.

SQ4: What are the characteristics of the modern workforce in the context of the Estonian job market?

This question intends to analyse the characteristics of the modern workforce narrowing down the study to the Estonian labour market aiming to provide insights into currently available PES solutions for further enhancements.

2. Research Methodology

This chapter discusses the theoretical approach of the research explaining the formation of the research methodology and associated strategy.

The chapter goes into detail on the justification for the research design, the verified research strategy, and the data-gathering methods adopted to address the stated research questions. Interpretation of results will be discussed in the chapter that comes after the definition of data analysis techniques. This chapter will discuss how the research is conducted, the choice mix methodology approach and data analysis will be further elaborated.

According to Hair, the three stages of research, are formulation, execution, and analysis [17]. The necessity for the research is established and the problem is identified during the formulation phase. In the execution phase, data collection features are defined for sampling, data collection, data collection methodologies, data collection, data coding, and data storage. The third phase assists in the analysis of the data obtained during the execution phase by interpreting and drawing conclusions in accordance with the constraints of the research. The academic contribution is made at the conclusion of the analytical process, which eventually establishes the new information [17]. The components of the methodology, such as the strategy, approach, and research philosophy, are useful in establishing the structure of the research. In order to generate new information and convey trustworthy discoveries, the research process is a methodical way of gathering and analysing data that has been obtained [18].

2.1. Research design

The choice of a topic and a paradigm should be the first step in the design of a research study. A paradigm is a comprehensive perspective on beliefs, attitudes, and research methodologies [19]. The study used a mixed methodology since it included a survey with both quantitative and qualitative components as well as a series of semi-structured interviews that produced qualitative findings for the study. According to literature justifications, using a mixed methodology in research is "a methodology and method to research in the social, behavioural, and health sciences in which the investigator gathers both quantitative (closed-

ended) and qualitative (open-ended) data, integrates or combines the two, and then draws inferences (called "metainferences") from the integration that provides insight beyond what can be learned from the quantitative or qualitative data" [20]. The study is focused on qualitative aspects of user experiences and expectations for identifying improvements to streamline the Public Employment Service provision. According to Creswell [21], “qualitative study can be defined as an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting”. A survey and semi-structured interviews were used as tools for the study.

2.2. Research approach

This research has taken a mixed methodological approach combining a quantitative survey and a qualitative interview series to the analysis of awareness of available solutions, challenges, and expectations of people from the e-tootukassa PES digital self-service implemented in Estonia. Identifying characteristics of the modern workforce has also been given attention as the final part of the study.

The study was carried out in two stages a survey, and semi-structured interviews. The survey was designed to identify the awareness level, challenges, and expectations of PES clients aimed at upskilling and job searching. The survey was used as the tool to find answers for the first three sub-questions of the research. The third sub-question aimed to determine what employers and job seekers expected from PES self-service offerings. The third question in the survey was intended to elicit responses from job seekers, and the interviews were intended to elicit responses from employers. The fourth sub-question, which aimed to determine the trends and characteristics of the current workforce in order to provide insights for the service design and future improvement of PES provision, was addressed by interviews with industry professionals representing employers.

Interviews were planned with stakeholders from the private sector industry experts who are involved in recruitment and skill management activities. It was expected to understand the challenges in current solutions and expectations for future improvements from a practical point of view through these interviews. Challenges in current solutions and Expectations for

future improvements, new trends, and characteristics commonly seen in the modern workforce were focused to understand from the interviews. It was identified in the literature review that surveys and statistical approaches [22] [23], interviews [24], and user-inclusive analyses are popular tools among scholars in studies of analysing qualitative aspects of information systems implementations and including recommendation systems [25] [26].

The author adopts an inductive approach as a research approach method to address the research problems. Since there is no sufficient literature on the same topic, it is suitable to take the inductive approach rather than the deductive approach which suits the instances aimed at testing an existing theory [27] [28]. The inductive approach consists of three stages as; i) Observation, ii) Pattern recognition, and iii) Developing a theory or a general (preliminary) conclusion. The drawback of the inductive approach is that a conclusion reached using this methodology can never be completely confirmed. It may, however, only be revoked [28].

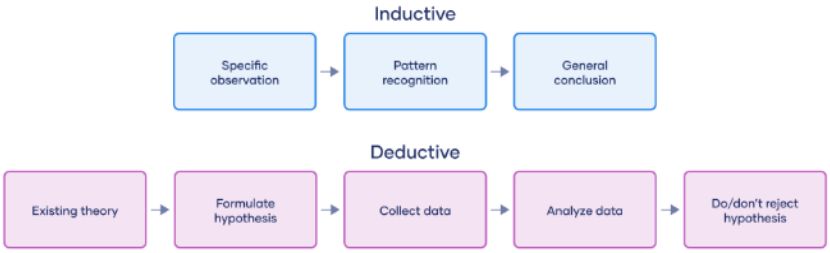

Figure 1: Inductive vs deductive reasoning research approaches

(Source: https://www.scribbr.com/methodology/inductive-deductive-reasoning/ [28])

A triangulation method was applied under an inductive approach to validate the research findings. Triangulation involves using multiple sources or methods to gather data on a particular research question, with the aim of improving the validity and reliability of the findings [29]. Triangulation has also been seen as a qualitative research technique for testing validity by bringing together data from many sources [30]. Additional topics that emerged from the survey are discussed as well when they are considered relevant to the study's overall objective.

2.3. Population and Sampling Methods/Techniques

As the sampling method, the non-probability sampling technique was utilized which is often associated with case study research and qualitative analysis. The sampling strategy combined snowball sampling, which uses a few cases to help encourage other cases to take part in the study, and convenience sampling, in which cases are readily and easily accessible to the author [31].

Purposive or Judgemental sampling has been utilized for expert interviews, a method where specific situations, people, or events are purposefully chosen in order to reveal significant information that cannot be received through other possibilities [31].

2.3.1. The Survey

Since the objectives of Public Employment Services (PES) are established towards the entire workforce as a whole, age or gender and such demographic factors were not considered to determine the research sample. However, the sample was narrowed down to the people who live in Estonia or who have experience with the e-tootukassa self-service platform since the research was done based on the Estonian PES solution, e-tootukassa which is deployed by the Estonian Unemployment Insurance Fund (EUIF). It was noted that similar research in earlier literature wasn't explicit about the sample size [32] [33]. It is described in the methodology of the Estonian labour force survey that the previous age groups considered for studies of economic activities were from 15 to 74 and this has been subjected to change from 15 to 89 in 2021 [34]. Considering the above fact, the survey of the study was created to share among any age group who could be contributing to the workforce. However, the age factor was broken into six categories in the survey for the purpose of identifying the needs and challenges specific to particular age groups. Identified age groups were, i) Below 15, ii) 15-24 years, iii) 25-34 years, iv) 35-54 years, v) 55-64, and vi) Above 65. The age groups were determined because most young people may begin thinking about their higher education and career plans between the ages of 15 and 24. Between the ages of 25 and 34 and 35 to 54, most people may be planning career enhancements and stable income. Those

over 55 may be more concerned with creating a safe and secure future for those who will be retiring.

A set of requirements was created to obtain a sufficient number of responses from the appropriate population for a questionnaire as,

i) The individual is required to use the internet

ii) The individual is required to understand Estonian or English

iii) The individual is required to be interested to participate in the survey

The reason for the individual was required to access the internet because the survey was focused on analysing aspects of PES provision which requires internet. Since the survey was also circulated through different channels based on the Internet, having access to the Internet was considered an obligation for the survey participants.

The survey was deployed in both Estonian and English aiming to achieve a fair and nonbiased response rate from both local and foreign communities living in Estonia.

2.3.2. Interviews

For the Interviews, the stakeholders who are experts in the recruitment field and skill adaptations were selected from popular corporate sector organizations in Estonia (Appendix 3 - List of interviews). Seven interviews were conducted representing experts from management positions and human resource-administrative positions from four organizations. The Organisations represent a leading financial organization in Estonia, two leading software development and ICT service-providing organizations in Estonia, a human resource consulting organization, and Tallinn University of Technology representing PES assistance in the academic sector recruitments. Interviews were organized with structured and semi-structured questions aimed to find answers to the sub-questions three and four of the study.

2.4. Data collection methods/ techniques

A survey and expert interviews were conducted as the method of data collection aiming to find answers to the research questions. The survey was designed aiming to find answers to subquestions 1, 2, and 3 covering the awareness, challenges, and expectations of PES digital self-service provision from the user's perspectives. Interviews were designed aiming to find answers to subquestions 3 and 4 focused on expectations and characteristics of the workforce which can provide insights to improve the PES digital self-service design and service provision.

2.4.1. Survey Questionnaire

The survey was conducted over the Internet through selected social media groups popular in Estonia at the time of the study. Facebook was identified as the most popular social media platform in Estonia from the year of March 2022 to March 2023 [35].

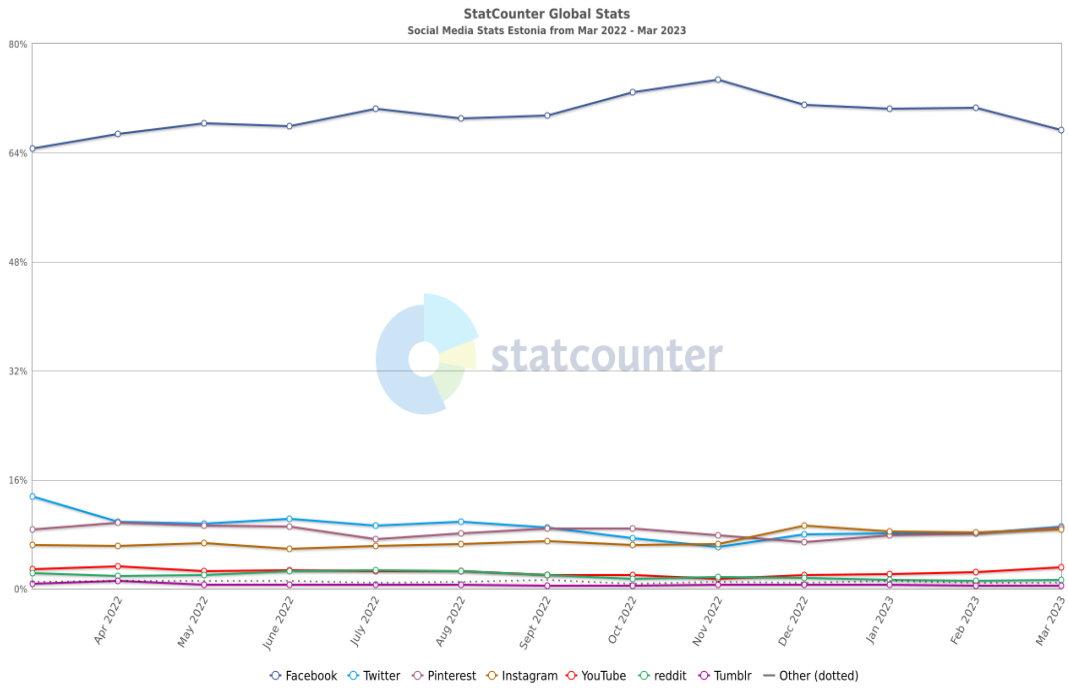

Figure 2: Figure 2Stats determining the popularity of social media platforms used in Estonia

(Source: https://gs.statcounter.com/social-media-stats/all/estonia)

Hence, Facebook was selected as the platform to distribute the survey questionnaire. The survey was circulated in two popular and active Facebook groups representing job seeking young communities, “Töökas noor” which had 7.092 members, and representing ex-pats living in Estonia “Expats in Tallinn/Estonia” which had 20,657 members by the date 13th April 2023. Another survey post was also launched and circulated geographically covering the entirety of Estonia through Facebook. All the survey responses were anonymous and none of the personal identifiers were collected from the survey.

The survey was circulated in both Estonian and English languages to gain more reach and all the responses were translated into English for the combined analysis. It was an important aspect for the author to gather insights from both the local community and foreigners living in Estonia since Estonia is adopting an inclusive society according to the Cohesive Estonia Strategy 2030 [36], the number of foreigners welcoming to work in Estonia in near future will be high and the expected impact and social contribution of PES digital self-service solutions will be high. It was expected to represent a fair and nonbiased group of residents in Estonia and the survey was expected to receive at least 150 responses for the analysis. The number of responses a participant can submit was controlled to one response by the settings in the survey form.

In the Survey, Respondents were given to answer a series of structured and unambiguous questions. According to Hair and Saunders, a good survey consists of a logical flow in the structure of the questions, a suitable method of conducting the survey, and pilot testing to assure the reliability of the collected data in obtaining a solid response rate [17] [18].

A pilot test was conducted to validate the questions internally using 5 selected test users (Appendix 3) representing both academic and non-academic backgrounds. Consisting of test users from both academic and non-academic backgrounds aimed to validate the requirements of scientific research and to validate the understandability from a general user's perspective. Real respondents were not used for the pilot testing and pilot survey responses were not considered for the analysis of the research.

Survey questionnaire could be divided into 4 areas of information, i) demographic and background information of participants, ii) awareness, iii) challenges, and iv) expectations of PES self-service solutions. The questions were elaborated conditionally such that

participants get the next question based on the answer provided for the previous question. The author expected to keep the focus of the respondent on the questionnaire avoiding exhaustion that can happen due to irrelevant questions. Also, this helps to shorten and minimize the time duration a respondent should spend on the survey. The survey was composed of 26 questions and the participant could receive a number between 10 and 26 depending on the conditions applied

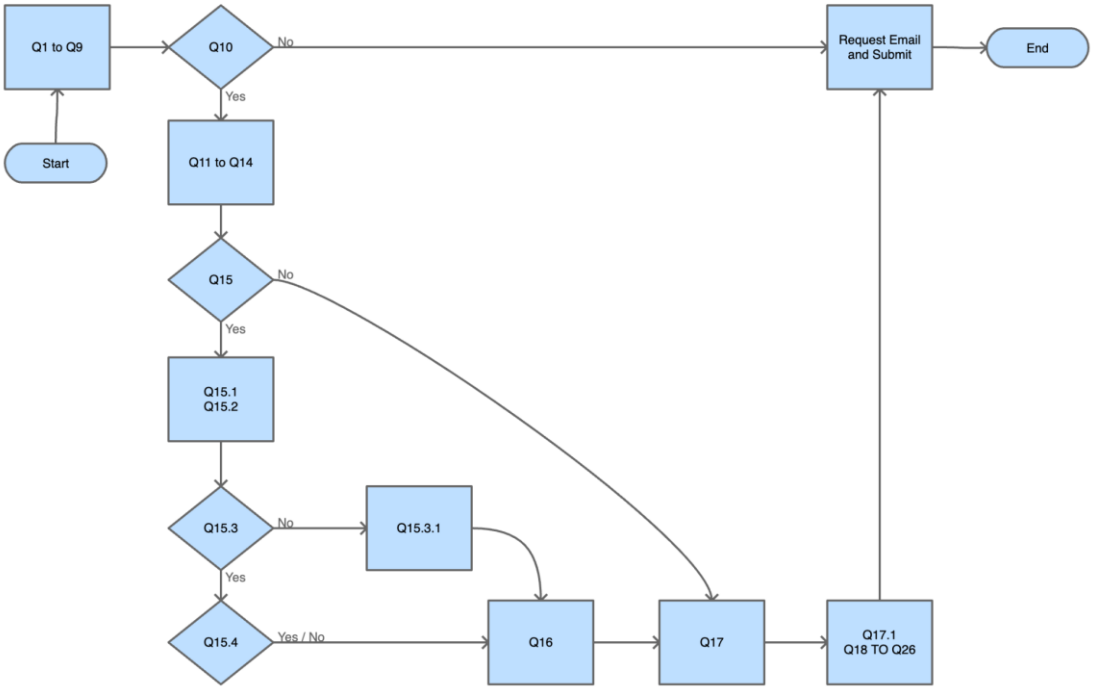

Figure 3: Design of the conditional flow of survey questionnaire

2.4.2. Interview Questionnaire

For the expert interviews, the questions were designed on a structure yet gave the freedom for the respondents to express their own ideas and opinions. The Interview Guide was prepared for the reference of the author to support keeping the focus of the discussion within the scope of the research and to avoid missing any important topics planned to be discussed. A general outline of the questionnaire was shared with the interviewee a minimum of 3 days before the interview date for preparation and clarification's purpose from the interviewee's end.

Interviews were designed to find answers for the research sub questions 3 and 4 which were focusing finding out expectations of PES self-service provision from the corporate sector user's perspective and identifying the characteristics of the modern workforce which could affect the PES solution design and service provision. The interview questionnaire could be categorized into 3 sections i) background and relevance of the participant, ii) expectations, and iii) trends and characteristics.

2.5. Type of inferences

First part of the study was the survey which is a statistical analysis of data aiming to retrieve predictions and conclusions based on the analysis. Statistical inferences are mainly depending on the size of the sample, variability in the samples, and the size of observed differences [37]. In order to ensure the inference of the statistical analysis, the author has guaranteed to obtain data from a random sample and that individual observations were independent. Additionally, attention has been given to the following 5 steps in terms of statistical analysis i) plan and design, ii) collect data, iii) analyse data, iv) interpret results and v) present results.

For the interview responses analysis, which is the second part of the research, a thematic content analysis was performed which is the most common method of analysis in qualitative research [38]. Interview responses were analysed forming themes that support coming up with conclusions and recommendations. Thematic analysis was consisted following steps extracted from the 15 steps thematic analysis model presented by Anderson [38].

I. Code/ Label the whole text
II. Make multiple copies of the interview transcript
III. Highlight relevant criteria for the study
IV. Re-read and re-label the transcript
V. Define, categorize, review, and re-categorize data until it reaches a satisfactory level where the categories become the themes that reflect the interview transcripts as a whole.
VI. Documenting the created narratives which include quotes from interviews.

2.6. Tools used

To conduct the survey, Google Forms were used to distribute the questionnaire among the selected groups of participants. Conditional expansion of questions was applied by the creation of the survey and the number of responses a participant can submit was limited to only one response by the settings of the form creation. Google Sheets were used for the data analysis and interpretation of diagrams. The calculations were done using simple formulas available in google sheets.

Interviews were conducted via Microsoft Teams where recording and transcribing were done. The transcript files were cleaned up, prepared, and stored in document format. NVivo V14.23 was used for the processing of interview transcriptions for the qualitative analysis and themes-generating process. Google Forms and simple formulas were used for the graphical representation of some interview results.

2.7. Ethical issues and commitments

The participation and collaboration of individuals and knowledgeable stakeholders are evident in this study. No sensitive data have been used or published during any stage of the study. Interviews were designed with respect and in a non-biased manner and interviewers were not influenced or pre-implanted with expected outcomes by any means. Prior approvals have been requested for recording interviews. The potential annoyances for the interviewer were minimized by scheduling interviews and informing them a minimum of two weeks in advance. Details of organizations represented by some interview participants will not be disclosed upon the request of the interviewees. Personal identifiers were not collected in the survey, and responses were submitted anonymously.

3. Related Literature and Theory

In accordance with the proposal by the European Commission, European Unemployment Reinsurance Scheme has brought national policies for the protection of jobs and skills facilitating the transition of the unemployed from one particular job to another job [39]. Public Employment Services (PES) aim to facilitate proactive recommendation of occupations and skills to the people preparing them for future labour market demands and minimizing the unemployment risks. Studies based on AI-supported classification systems can be widely seen in the occupation recommendation systems [40], but it shows a gap in research on the analysis of classification systems for upskilling and reskilling the labour market according to the future demand of competencies from the client perspective representing job seekers and employers [41]. Training classification systems have been subjected to research in various aspects such as analysing job miss-matches in the labour market, analysing impacts of limited education, and analysing the reliability of O*NETs between US and European databases [42] ("O*NET database is a large job analysis operated and maintained by the U.S. Department of Labour" [43]), Crosswalk translation of US and European occupation codes [44], Unemployment forecasting models [45], Automatic recruitment data collection models and in Education quality assessment models. During the literature review, it was identified that analysing the awareness of available employment and training recommendation systems or analysing measures for possible improvements from the client perspective representing job seekers and employers of current solutions have not been given the proper attention. However, the related studies in the domains of employment and training recommendation systems provide great input for this study in terms of providing background knowledge and methodology approaches.

3.1. Significance of Public Employment Services (PES)

In the comparative analysis of the field of study mismatch done by Sellami et al; authors have focused on comparing the horizontal dimensions of education mismatch by analysing different methodologies which have been used in previous studies. In this paper, authors have discussed the methodologies based on the ISCO skills and occupations classifications framework and other frameworks such as the Standard Swedish Occupational Classification

(SSYK) and SUN2000 classification [46]. In the same paper Sellami et al, have claimed how the subjects such as Health, Engineering, Business, and Science have become the most popular subjects in Europe over once-popular subjects such as social sciences, Business and Law, Humanities, Arts, and Education. Also, they claim that following the trends incurs positive impacts on both earnings and job satisfaction [46]. Pontes et al. claim that 8–9% of the 2.66 billion workers will have new employment categories by 2030 and that 75–375 million people globally will be able to transfer job categories as a result of the evolving labour market environment in their examination of correlations between job profiles and abilities in the future [47]. World Economic Forum has predicted that 1.7 million new jobs will be available in these rising professions by the end of 2020, and this number will dramatically rise to 2.4 million chances by 2022 [48].

In a study done in 2017 taking 23 countries into account, Montt presents statistics of cross-national analysis of educational mismatch as the highest incidence rate from Korea which is at 50%, England and North Ireland at 50%, Italy at 49%, the United States at 45%, and the lowest rate from Austria which is 18% [49]. Alzubaidi reviews several studies which have investigated horizontal mismatch and claim that horizontal mismatch is a prominent aspect of a labour market and says literature from non-western contexts is rare in the field of horizontal mismatch of jobs and education [50]. Mismatches between jobs and education in an economy directly cause skill demand-supply mismatches which can affect the overall job structures, foreign trade, and institutional changes in a country [51]. This literature proves the significance of skill classification and analysis which contributes to the economic well-being and public good both directly and indirectly.

Another aspect of the previous studies is mapping the codes of different classification taxonomies used in different countries. A study done to evaluate concordances between EJMs (Job Exposure Matrices) between the United States (US) and Italian O*NET data has matched 684 US job codes to 586 Italian job codes through crosswalks to the 280 ISCO job codes. However, authors claim that differences in exposure levels between countries can influence the cross-country agreements challenging cross-national job matching [52]. A crosswalk is a reliable tool with high sensitivity and high specificity that is being used in translating Italian job codes (ISTAT-CIP-91) to international job codes (ISCO-68) eliminating the drawback in the manual translation [53]. However, while these technologies have been prioritized for job code mapping, skill mappings have not received enough

attention. In the unemployment forecast analysis of the Romanian use case, the authors claim that Romania has shown ups and downs in the unemployment rate due to various factors like economic downfalls, amount of legal or illegal migrations, and pandemic situations [6]. The authors also claim that the rate of unemployment of people with higher education shows a low rate and hence they discuss the importance of preparation of vulnerable groups and the informal area of the economy towards future skill demands. Also, the authors argue that the unemployment rate increases with digitalization due to automation [6] and hence it highlights the importance of preparing the labour force for new job areas which will be demanded in the future as a result of technological changes and other factors.

Studies done in the fields of assisted learning and assisted teaching, recruitment support, job seekers and recruitment mapping, vacancy classifications, and job recommendations are popular in the Artificial intelligence supported classification systems domain. Torre and Torsani present an ontology-based recommender system for teacher training and support for language teaching evaluating the correctness and impact based on a study carried out in Italy [54]. It is an obligatory factor of college educators to provide students with courses and training modules that are consistent with the skills in the job market according to the recent industry trends, recruitment demands, and job competence requirements [55]. Based on the study done in Kazakhstan, analysing quality assurance measures of education, authors have proposed an algorithm for the assessment of education quality in universities and they claim that they can be used in contact designing for education, diagnosing university level, rating, and types of state control, validating the objectives of training organizations and in defining directions of future scientific research studies [56]. In a study done in the Czech Republic discussing new opportunities incurred in employment and education sectors after the COVID-19 pandemic, the authors have identified a weakness in the education system in including futuristic skills in the curriculum and authors claim the necessity of having a skill predicting and recommendation system in the education system discussing the opportunities incurred by the pandemic [57]. Studies have analysed how classification and recommendation systems can be used in the personalized resource recommendation of teachers' training [58] and employee training [24]. In an integrated approach of analysing a recommendation system for increasing the effectiveness of learning, out of the sample of 519 students used for the study, the authors claim that the efficiency level increases by 25% where the maximum could go up to 44% when personalized recommendations were used for online learning module suggestions [25].

3.2. Related Studies

Labour deficit is an undeniable fact of economic growth and hence European countries have adopted new legislative and prescriptive frameworks at the national level and at the European Union level since the COVID-19 pandemic boosted the digitalization almost everywhere around the globe [59].

One of the best examples of this is AMKoodari, which is a project launched by the Finnish Ministry of Education and Culture, as a training recommendation tool to guide people looking for upskilling and reskilling in the ICT sector as the first phase of the project due to the high demand incurred towards ICT and computing skills after the pandemic crisis. In their background research, they have found out 82% of the respondents of the project were people who have experience more than 10 years, and the majority were between the ages of 35 to 45. Out of the respondents, 42% have been looking for professional development and 25% were looking for a career change and 16% were learning out of pure interest. The authors also claim that the project has been a success while explaining the critical areas which should be paid attention to such as privacy, data analysis, AI methods, algorithms, decision-tree tools, and combinations of them [26]. In the study done by Blazic on the cybersecurity labour shortage in Europe, the author claims that steps and initiatives are anticipated to address the EU's uneven distribution of accredited cybersecurity educational programs and professional education providers' training programs [22].

Studies about occupational recommendation systems seem to be popular in academic literature and resources were widely available for research. With the advancements of natural language processing and big data analytics, an emerging field of Labour Market Intelligence (LMI) has been introduced by the labour market community aiming to design and utilize AI algorithms and frameworks to analyse data related to the labour market supporting policy making and decision-making processes [60]. International and European classification taxonomy frameworks provide great input in the development of systems that combine skill mapping and occupation classifications [61] [62].

Machine learning techniques can be used in hiring to improve the search process and identify applicants with the required abilities. The literature review revealed that LinkedIn

information on past and current occupation data has also shown great progress in the occupation recommendation models [23]. IBM's AI platform, Watson has also been used in cases for citizen inquiries and responsive government [63] and this could also be used as a tool in the PES self-service provision and skill development. Skill2vec is another neural network design that is able to convert skills into a new type of vector space that may be used for calculations and displays correlations between skills [64].

It was also noted that the research of labour law and administration [65], service design [66] [67], and model validations [68] have received increased attention in the literature on public employment services (PES).

Three studies were found carried out in Estonia on the improvement of a self-service employment mediation process in the Estonian Unemployment Insurance Fund [69], Analysis of the Estonian Unemployment Insurance Fund's Website's Accessibility Using the Service Working Ability Assessment as an Example [70] and an analysis of EU readiness for intelligent public employment services at the local and international levels [41]. However, the existing "public employment services (PES)" supporting upskilling and reskilling to close the skill gap in the labour market aren't getting enough academic attention to conduct studies on their effectiveness, usability, or functioning from the client's point of view.

3.3. Theoretical background

Theory of Reasoned Action (TRA) [71], Theory of Planned Behaviour (TPB) [72], Technology Acceptance Model (TAM) [73], and Unified Theory of Acceptance and Use of Technology (UTAUT) [74] are some classical theoretical frameworks which were common in the literature related to the technology acceptance research studies. Among them, TAM introduced by Davis in 1989 has been noticeably used in studying user acceptance behaviour in various disciplines of literature. TAM aims to identify design issues and forecast information system adoption before consumers interact with a system. According to TAM, perceived usefulness and perceived ease of use are the two main determinants of consumer acceptance of any technology [75].

The structural equation model of end-user satisfaction presented by Stone in 1994 is another widely used theoretical model which proposes that management support, ease of system use, and end-user previous computer experience have a similar meaningful impact on both computer self-efficacy and outcome expectancy [76].

In addition to the classical frameworks which have been used in studies related to technology acceptance and usability analysis, E-QUAl, E-SQUAL, SERVQUAL, Site-QUAL, and WebQual are some e-service quality models which are widely being used in assessing public sector service quality, usability, user experience and interaction with services and in designing citizen-driven public sector service structure [77] [78].

In addition to the aforementioned, Seth and Deshmukh present an analysis of 19 conceptual service quality models reported between 1984 and 2003 in order to provide a critical evaluation of each of them in the transition from traditional services to web-interacted services [79].

In the end, there isn't a single ideal model that works in every circumstance. To achieve the desired results, many theories are frequently used, and elements from different ideas are combined [80].

4. Results and Data Analysis

This study is divided into two sections: a survey and expert interviews. This section will elaborate on the data analysis of the survey and the expert interviews. The outcomes of the interviews will be addressed after the data analysis of the survey has been elaborated. The survey intends to find answers to the first three sub-questions of the research which is directed toward studying current solutions, challenges, and expectations of public employment service solutions from the perspective of job seekers who take the assistance of PES self-service digital platforms. The expert interviews intend to find answers to the third and fourth sub-questions of the search which tries to identify the trends and characteristics of the labour market and to analyse expectations of PES solutions from the perspective of employers and industry experts in the labour market.

Survey Results

4.1. Demographic statistics of results of the survey

The survey was deployed in a Google form and circulated for a period of one month for data collection. Facebook was used as the main platform to circulate the survey and shared it in selected two popular Facebook groups in Estonia. In addition to that, a Facebook post was circulated covering all the geographical locations in Estonia. Two survey forms were shared in English and Estonian languages.

176 responses totalling 98 in English and 78 in Estonian were gathered. Estonian responses were translated into English and a cumulative analysis was conducted. The majority of 90 responses are from Estonian residents while the rest of the 86 responses are from respondents representing 35 different countries. More diverse demographic answers made it feasible to get input from a broad spectrum. The majority of respondents represent the age group 25-34 following the age groups 15-24 and 35-54. There were only 5 responses, representing 2.8%, from respondents who represent the age group below 15 and age groups above 55. The age group 15 to 55 is considered the most productive age range [81] and this has impacted positively to the significance of the data set since, the most reliable sample to highlight persistent issues and needs in the labour market and propose workable answers from the perspective of employees is the active workforce.

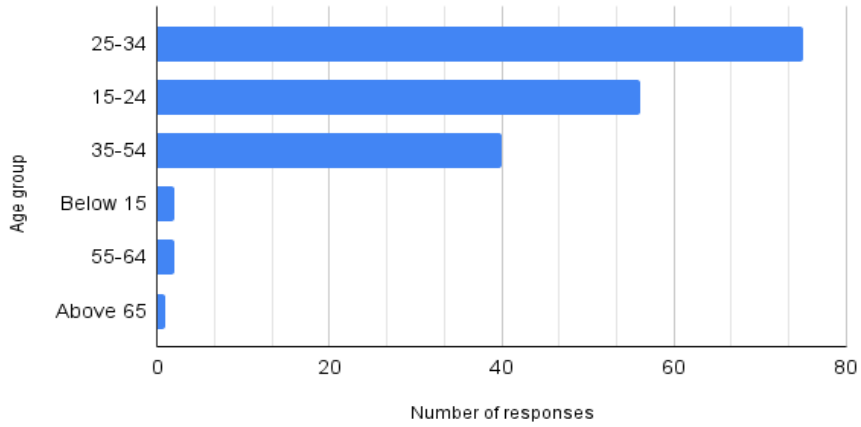

Figure 4: Age group categorization of survey responses

A majority of respondents (33%) have obtained a master's degree, followed by 31.3% who have a bachelor's degree, 19.3% who have only completed primary education, and 10.2% who have completed secondary school. The remaining 6.2% of respondents have either vocational education or a doctorate (1 response). The education background of respondents consists of a fair distribution of education levels representing ideas of people with different educational backgrounds and qualifications.

4.2. Significance of Public Employment Service (PES) Self-service Digital Platforms

The survey respondents were asked to rank the three most significant functions they anticipate from a public employment service (PES) self-service digital platform, despite having prior experience with PES self-service solutions. The activity with the highest reported frequency (125) was help with finding a job, which was followed by guidance on future skill demands (94). This demonstrates how the present-day workforce prioritizes learning future-demanding skills and is curious about accomplishing so. The following three prioritized functions: assistance in identifying appropriate training (79), free learning opportunities (78), and the ability to learn new skills with or without expenses to change careers (77) showed closer correlations with one another. Three of them focus on upskilling, which demonstrated that public interest in upskilling is at a high level and that the workforce is prepared for the PES concept of upskilling and reskilling. According to the report on world

human capital by The World Bank in 2020, if a child born in Estonia gets access to complete education and adequate health, they will be 78% as productive as they can be when they grow up [82]. This is greater than the average for high-income countries and the region of Europe and Central Asia. The HCI value for Estonia has improved from 0.73 to 0.78 between 2010 and 2020 [82]. Thus, it shows the potential of Estonia's human capital, which may be carefully developed with the backing of the public's willingness to raise people's levels of education and competence.

Applying for social support from the Unemployment Insurance Fund has been recorded as having the lowest frequency of responses (75) among those searching for employment opportunities and new learning possibilities, demonstrating that the general public values making sustainable decisions over short-term survival objectives.

Functions anticipate from a public employment service (PES) self-service	**Frequency**
Assistance to find a new job	125
Guidance about demanding skills in the near future	94
Assistance to finding suitable training	79
Opportunity to apply to training free of charge	78
Opportunity to learn a new skill to switch my job regardless of if it is free or not	77
To apply for a monthly allowance from the Unemployment Insurance Fund	75

Table 1: Functions anticipate from a public employment service (PES) self-service ordered by the frequency of responses

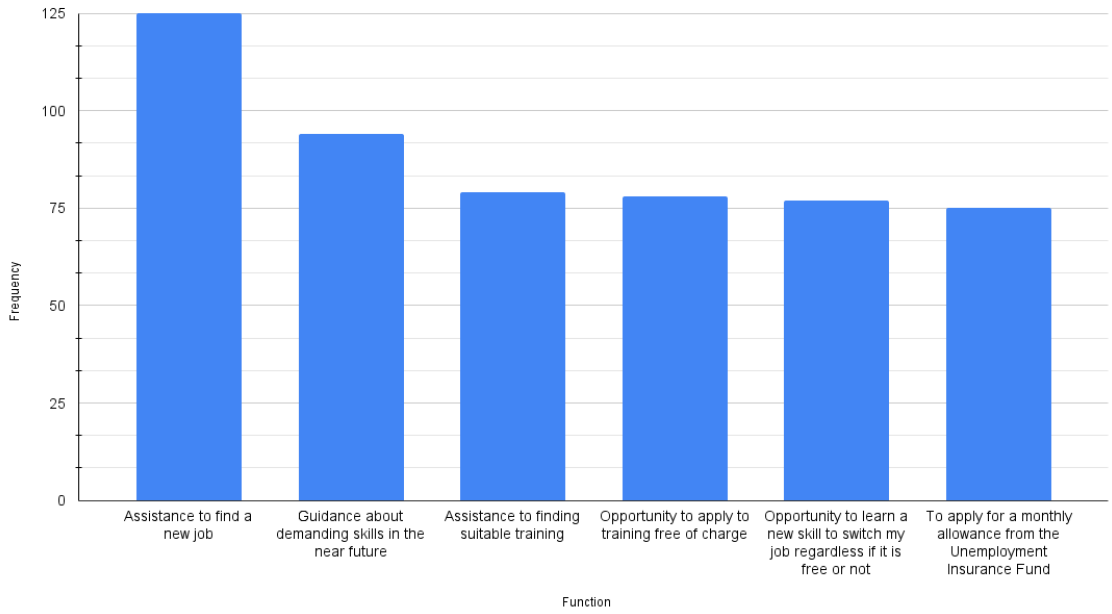

Figure 5: Functions anticipate from a public employment service (PES) self-service

4.3. User's Opinions Towards Public Employment Service (PES) Self-service Platforms

In the survey, question number 10 was developed to determine which respondents had experience using the e-tootukassa platform, and the survey from question number 11 was expanded to include questions about the difficulties and potential improvements towards such PES solutions taking e-tootukassa self-service digital platform as an example. Only the respondents who had experience with the e-tootukassa platform were allowed to answer the rest of the survey. This chapter's discussion of user feedback for the e-tootukassa platform will follow with the goal of generalizing it to PES digital self-service platforms as a whole.

Out of the 176 responses, 116 respondents, or 65.9%, indicated that they had never used the e-tootukassa service, while 60 respondents, or 34.1%, indicated that they had used it once or more. Out of the respondents who used the platform, 31 belonged to the currently employed category and 16 to the unemployed category. This shows that employed people have shown more interest in the e-tootukassa self-service platform than unemployed people, which shifts the focus of the study in a new direction.

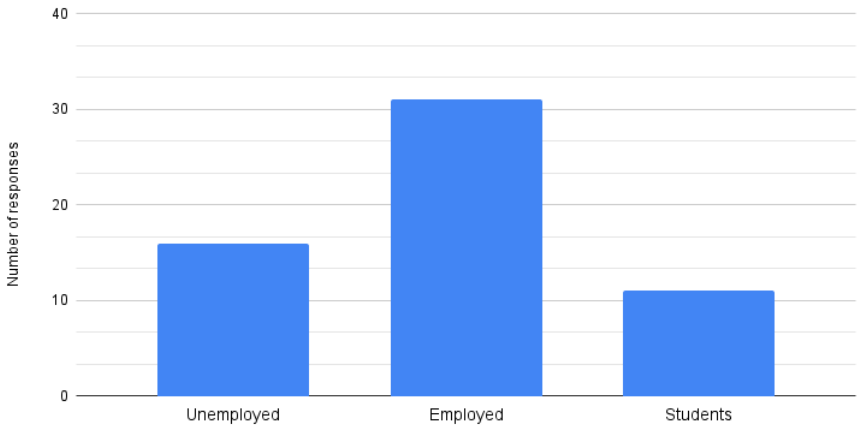

Figure 6: Background of respondents who have used the e-tootukassa self-service platform in Estonia

However, out of the respondents who are currently employed, 48.9% of respondents have shown motivation towards the platform to find a job while 42.6% of respondents have shown the motivation to find training opportunities for upskilling. This shows that people are motivated to look for work and upgrade their skills, regardless of whether they're currently employed or not.

Out of all responses, 51.7% of respondents, or the majority, stated that their motivation for lifelong learning is based on pure interest, regardless of whether it will advance their careers or not. The next 41.7% of respondents stated that their motivation for lifelong learning is aimed at promotions and career development.

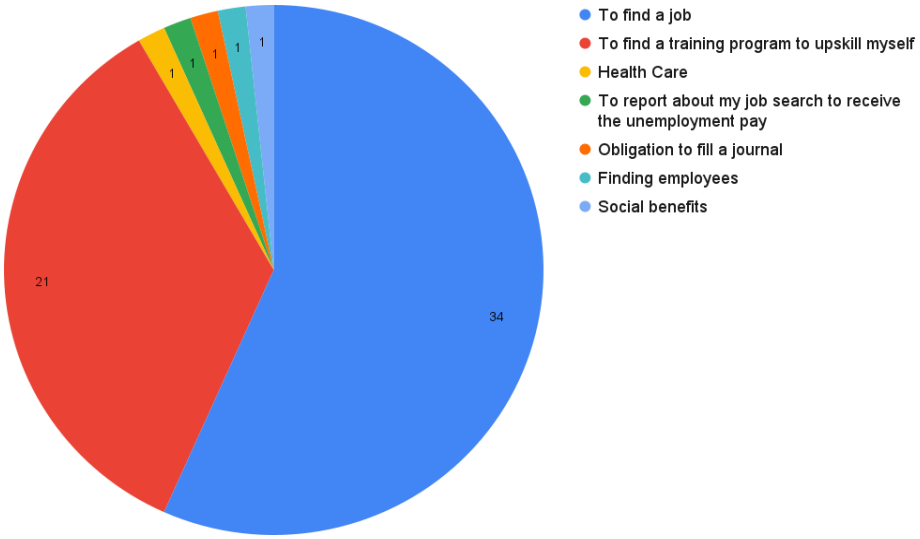

Figure 7: Motivation towards using the PES self-service platforms

4.4. Feedback towards the current solution (e-tootukassa; Estonia)

Among the respondents who were familiar with the e-tootukassa platform, 71.7% said they continued to continue doing so, while 28.3% said they had only ever used it once. However, 48.3% of users do not access the platform, compared to 28.3% who do so once a week and 16.7% who do so once a month. The percentage of daily users reported the lowest value at 6.7%.

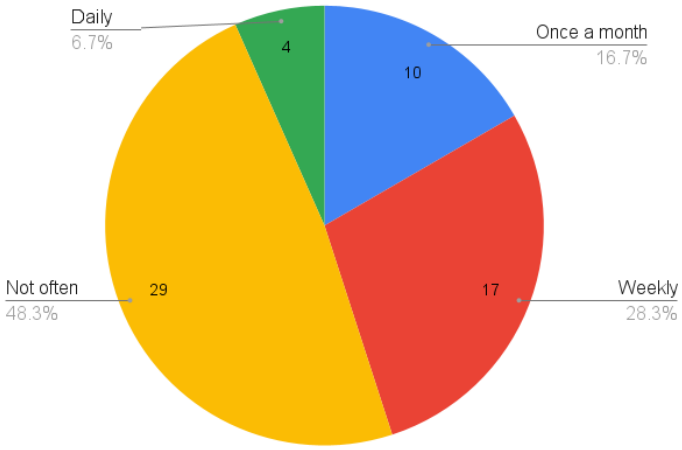

Figure 8: Frequency of use of the e-tootukassa self-service platform by survey respondents

It was also notable that just 35% of respondents who used e-tootukassa self-service platform have received recommendations for training, compared to 65% who had not. The participants have been provided the opportunity to choose their preferred training from the recommended programs, according to respondents, and the training program was chosen following an open discussion with the consultants. The respondents to the survey expressed appreciation for the procedure and the assistance offered by consultants. Only 57.1% of responders, however, have finished the training course they were enrolled in, and 38.1% have left the course early. The lack of scheduling flexibility, outdated curriculum, and inexperienced tutors was cited as factors for drop-off. Nevertheless, 76.9% of respondents said that the training program supported their job search, compared to 23.1% who said that the training programs were not helpful.

78.3% of respondents acknowledged satisfaction with the help they received through the e-tootukassa self-service platform for the job search while 21.7% of respondents were dissatisfied with the services received. The majority of users have given the e-tootukassa

self-service platform a rating of 4, which gives a good indication of the success rate of the platform among its existing users, on a scale of 0 to 5. But in order to further develop the platform, it is crucial to look into the reasons behind dissatisfaction and come up with measures for improvements.

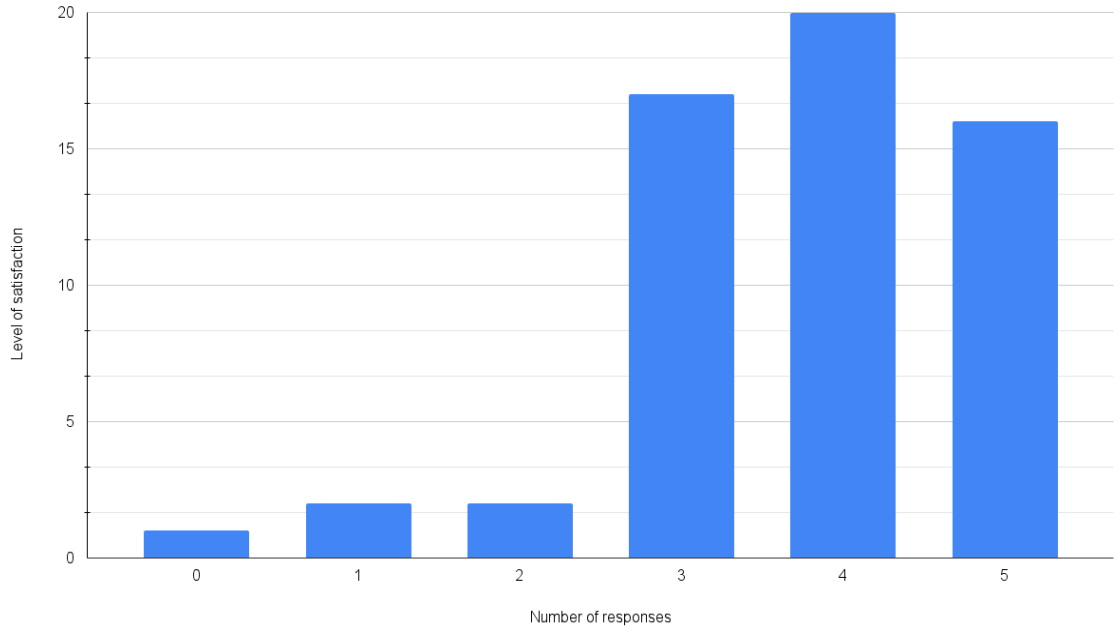

Figure 9: Level of satisfaction with the e-tootukassa self-service platform on a scale of 0 to 5

The majority of 57.1% of respondents have reported that they have found jobs from an external source while only 42.9% of users have found jobs through the e-tootukassa platform. Out of the respondents who have found job opportunities through the e-tootukassa platform, only 3 respondents have taken more than 6 months to find a job which indicates the likelihood of finding jobs is at a higher level, but it needed attention to find out the reasons for people being unable to find job opportunities even with the aid of training and consultancy. It was also found that exactly 50% of respondents claimed they neglected to update their resumes on the platform. subsequently was discovered that respondents who keep their resumes up to date in the platform received a greater number of job recommendations each month, whereas respondents who do not keep their resumes up to date reported receiving fewer job recommendations.

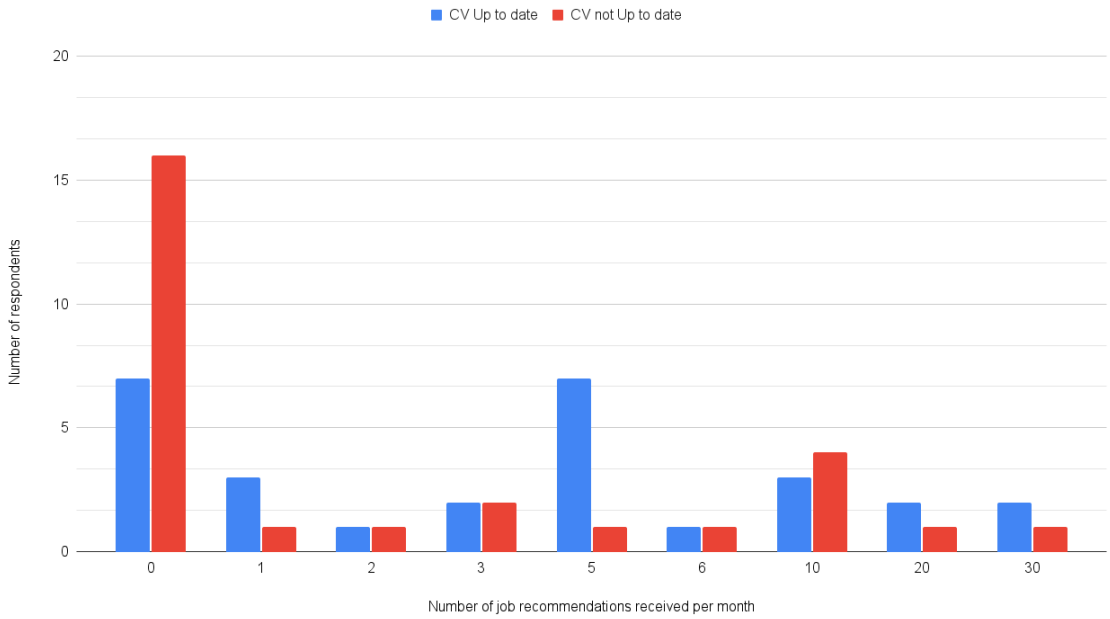

Figure 10: The number of job recommendations received per month based on the status of the resume

Only 20 respondents were reported as having enrolled in one or more training programs funded by the Estonian Unemployment Insurance Fund (EUIF), whereas 39 respondents were reported as having participated in no training programs at all. 32 respondents were reported to have not submitted any applications via the platform, while the number of respondents who have submitted one or more took a value of 21. Considering the above fact, the research suggests that the e-tootukassa platform does not seem popular among respondents for upskilling or for job applications. This is an area in which more attention should be given to future improvements in the e-tootukassa self-service platform as well as the entire system as a project.

The research also revealed that word-of-mouth advertising among friends has been the primary method of platform promotion following social media and online searching. Other sources mentioned by the respondents included their employers, consultants, or employees from EUIF, mass media channels, and healthcare canters. This gives a good insight into the future promotion and awareness campaigns of Tootukasssa.

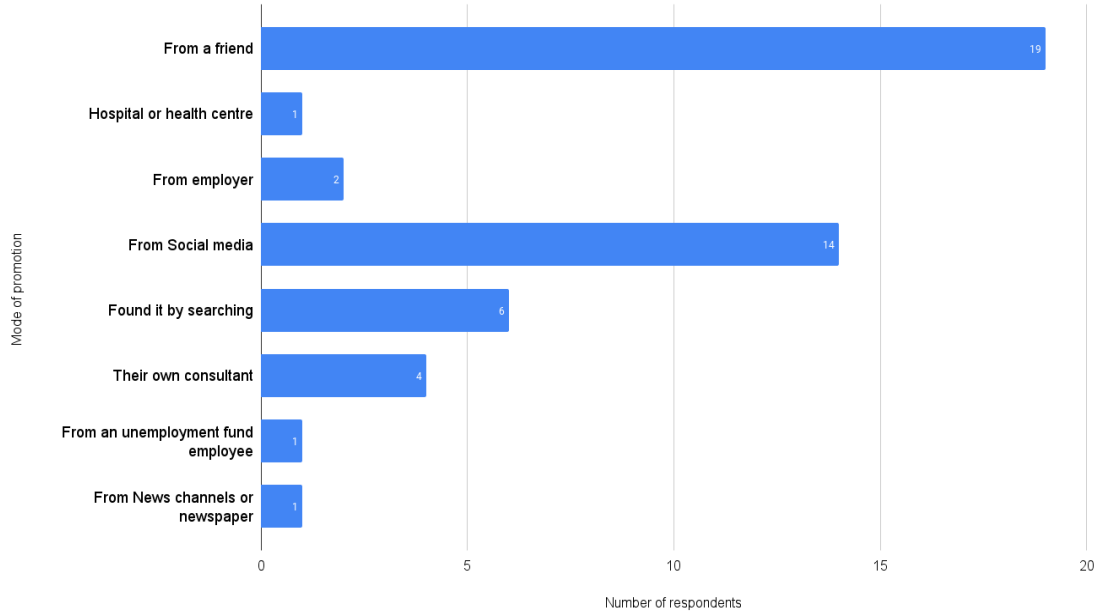

Figure 11: Methods of e-tootukassa platform promotion highlighted by respondents

4.5. Challenges and Possibilities to Improve the e-tootukassa Self-service Platform - Survey Respondents' Perspective

Lack of job opportunities

The respondents named a lack of job opportunities across a wide range of disciplines as their top issue with the e-tootukassa self-service platform. It is expected to locate employment opportunities from diverse disciplines since people with a variety of talents and specialties use the self-service platform. As a result, they have encountered a shortage of job postings that cater to a more extensive range. Respondents expressed dissatisfaction with the e-tootukassa self-service platform have stated that "*The job offers received by the unemployment fund are too for unskilled and low-paid workers*" while another respondent stated that "*Most of the jobs needed higher skills"* which illustrates the need for platform to provide job opportunities from a variety of backgrounds.

Weaknesses in the user-friendly design aspects

Numerous people have raised concerns about the platform's simplicity and user-friendliness. following are a few points repetitively highlighted by the respondents regarding the lack of user-friendliness in the e-tootukassa self-service platform.

Difficulty in finding relevant job applications was a problem that was mentioned more frequently. The automatic endorsement of job postings, regardless of specific criteria like language requirements, was identified as unfavourable by the respondents.

Less simplicity in the platform

According to respondents another difficulty that might limit the platform's popularity with the general public is that the platform does not give a clear picture of the services it offers and the unclear navigation throughout the platform. It was also highlighted that the user interfaces need to be improved and made simpler in the platform. Additionally, it was found that some people disliked the "*Too Much Text*" design style. The simplified search function has also been mentioned repetitively by respondents to be improved further.

Limitations in the credibility and quality of information

According to another respondent excessive information has been bought out as "*There is too much information together and it is difficult to find what is important*". In this case, the respondents have emphasized the necessity of focusing on the significant information that job seekers may anticipate from an employment support platform, such as the e-tootukassa self-service platform. Additionally, some responders have expressed dissatisfaction with the fact of having obsolete information displayed on the platform.

Limitations of linguistic translation

Although some respondents have reported weaknesses in the translations, some respondents have mentioned that the platform has proven to be improved over time. However, it was reported that the language translation of the platform has challenged the respondents to use the services provided through the self-service platform.

Frequently expiring sessions

Frequent expiration of sessions has been identified as a disturbance for the respondents since some have complained that they get pushed out of the platform in the middle of some actions. "*The system constantly logging me out while filling out the e-diary and I had to re-identify*" one respondent complained. Along with the session expiration, consumers have also indicated their preference for a faster and simpler login method.

Inability to explore training opportunities

"*Difficult to find information about the free courses they offer. It should be visible to everybody, not just for those who specifically ask for that info*". This was another problem brought up by a respondent, who demonstrated a strong level of interest in continuing education and upskilling. A person registered at e-tootukassa is currently required to speak with a consultant in order to figure out an appropriate training program to enrol in. One person brought up the idea that individuals would need the freedom to choose a program and make decisions for themselves. Additionally, some respondents stated that there should be more possibilities for training, underscoring the reality that there aren't enough opportunities for training in specific fields for people with a variety of backgrounds. Additionally, it was observed that respondents had suggested adding more online training opportunities and workshops and adding more courses on creating resumes, cover letters, and practice interviews, despite the disciplines they belong to.

4.6. Future Enhancements Suggested by Survey Respondents Towards the e-tootukassa Self-service Platform

As the final question of the survey, participants were given the opportunity to list any additional improvements and to state what they expected from a digital public employment self-service platform, using the e-tootukassa as an example. Some responders proposed adding new features, while others suggested enhancing and streamlining previously existing features before adding new features to the platform. A summary of new features and improvements proposed by respondents is expanded below.

Mobile application

The introduction of a mobile application was frequently mentioned as a future feature by the respondents, and it was also claimed that a mobile application might further simplify the platform usage than a website.

Integration with other employment platforms

It was mentioned by respondents that the self-service platform should be integrated with other popular employment platforms such as ‘LinkedIn’ in order to be open to a wider range of opportunities. It was observed that people compare the e-tootukassa self-service platform with other competitive platforms in the labour market and set high expectations towards the PES solutions as well. A respondent has consequently suggested enabling users to view details of other users' profiles who have viewed their own profiles.

Incorporate remuneration ranges

Another suggestion received from respondents was to include salary information in the platform such that people can search and learn the pay rates from the self-service platform itself.

E-newsletter

A respondent also proposed adding an e-newsletter to the self-service platform as a novel idea. However, the respondent has not given any additional details regarding the goals of the request.

Display pictures of the consultant

Another respondent raised the suggestion that showing the consultant's photo would help to personalize the interaction with the service. How big of an influence this may have on the self-service platform's productivity and satisfaction should be further studied and examined.

Expert Interviews

The aim of the interview was to find answers to the third and fourth sub-questions of the research which were directed toward analysing the trends, and characteristics of the labour market and analysing expectations of PES self-service solutions from the perspective of industry experts. Semi-structured interviews were conducted using a sample of seven interviewees representing human resource-administrative positions from four organizations. The Organizations include two top software development and ICT service providers in Estonia, a significant financial organization in Estonia, a human resource consulting organization, and Tallinn University of Technology, representing the use of digital PES self-service solutions for academic sector hiring (Appendix 4 - List of interviews). It was intended to establish a sample of participants with a wide variety of backgrounds with the objective to identify various issues from different viewpoints. All of the interviewees were based in Estonia, and the questions focused on the local labour market, yet on occasion they gave more generic responses to the questions.

Thematic analysis was conducted using an inductive methodology and hence it was expected to minimize the possibility of missing important ideas raised by the respondents. The thematic map has been divided into smaller parts according to the themes identified for the purpose of simplifying the analysis and the full map has been provided at the end by Appendix 6. Themes and codes created to analyse the interview transcripts are provided in Appendix 7.

4.7. Most Popular Recruitment Platforms Currently Being Used in Estonia - Results from Expert Interviews

In order to take the initiative to examine the advantages and disadvantages of one another and to determine the properties that interviewees value in such platforms, recruitment platforms that are often utilized on the Estonian labour market were first discussed with the participants. It was identified that LinkedIn and CV Online (CV.ee) are the most popular recruitment platforms in Estonia while none of the public employment services were mentioned as preferred platforms supporting recruitment activities.

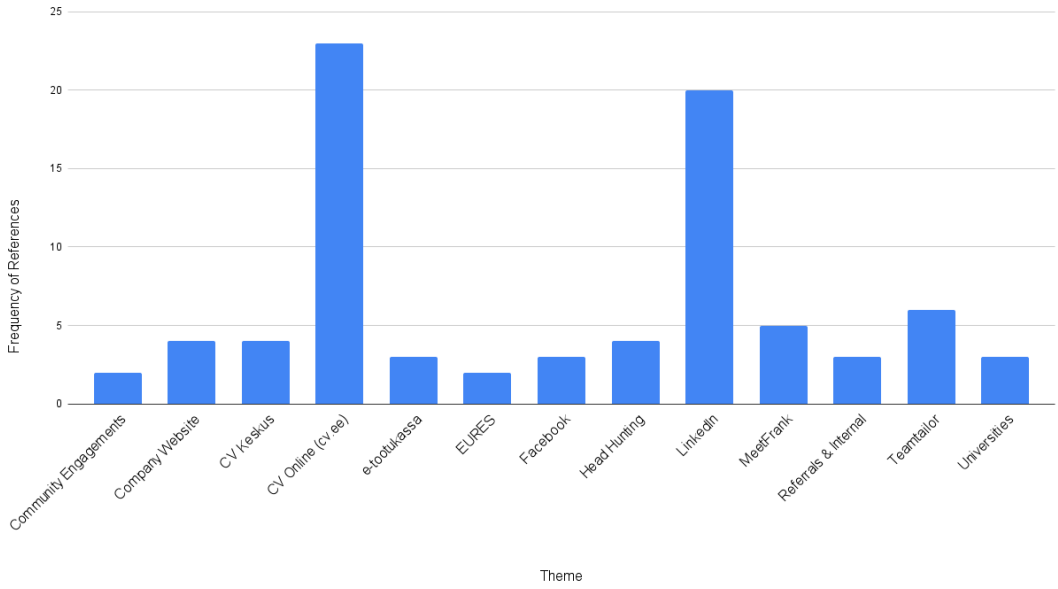

Figure 12: Popular platforms for Recruitment in Estonia stated by the interview participants

LinkedIn and CV Online (cv.ee) were mentioned by 6 interview participants out of the 7 which were the most commonly mentioned recruitment platforms in the study.

Theme	**Number of Interviews**	**Frequency of References**
Community Engagements	2	2
Company Website	3	4
CV Keskus	3	4
CV Online (cv.ee)	6	23
e-tootukassa	3	3
EURES	2	2
Facebook	2	3
Head Hunting	3	4
LinkedIn	6	20
MeetFrank	2	5
Referrals & Internal Candidates	2	3
Teamtailor	3	6
Universities	3	3

Table 2: The list of most commonly mentioned recruitment platforms by interview participants

4.8. Comparison of Competitive Advantage Factors in Recruitment Support Platforms and Shortcomings Noticed on the e-tootukassa serf-service Platform - Results from Expert Interviews

The variables affecting the competitive advantage of the platforms mentioned previously were discussed with interviewees in order to determine the qualities and features requested by industry experts from recruiting platforms. From experts' point of view who are engaged in recruitment activities, the ability of headhunting was identified as the most preferred feature in recruitment support platforms in general. Then the reputation and the popularity of the platform were highly considered since it can lead to accumulating a higher number of potential candidates in a single platform. Next on their list of preferred features was a system for recommendations and the opportunity to reach professionals who aren't actively looking for switching work.

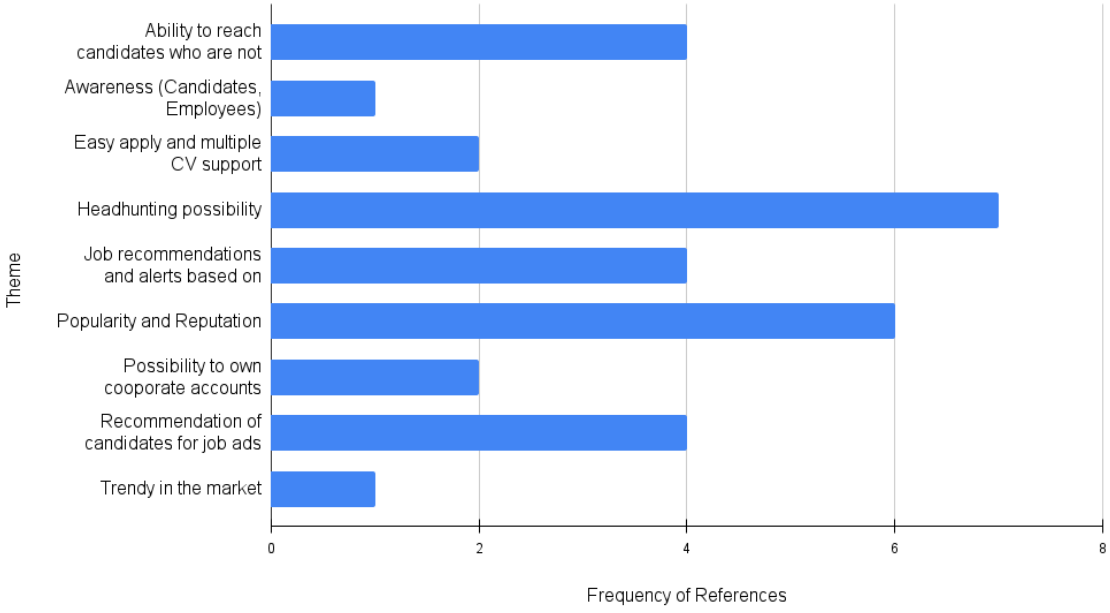

Figure 13: Competitive advantage factors in recruitment support platforms

It was designed to discuss the shortcomings of the e-tootukassa platform in comparison to the other recruitment support platforms participants have used together with the findings of competitive advantage elements.

Negative publicity was highlighted more frequently than any other flaws by the participants. Six of the seven participants have discussed how the e-tootukassa self-service platform's poor reputation and the public employment system as a whole have contributed to individuals being less engaged with the services offered. It was discovered that the phrase "unemployment insurance fund" by itself gives people a less positive impression of the system. One respondent stated that "*It helps mostly people who are less fortunate, for example, less suitable for the labour market or like people who have lost their jobs*" *(Interview G)*. It is not just the employers who have expressed this idea, but also those who represent the viewpoint of the job seekers. The survey response *"I have never been unemployed, so I have not used any of these"* demonstrates the negative publicity and the perception of people that the e-tootukassa system itself is made to help only the unemployed.

The fact that the platform is less well-liked by human resources (HR) departments was emphasized second, followed by the fact that there are fewer specialists on the platform. A few statements made by interviewees that support the fact that the platform is less well-known and less readily available on the e-tootukassa self-service platform are as follows.

> *"When we were still doing the blue-collar recruitment or the lower-level recruitment, then yes, we used to use we or we used tootukassa as well to post the open job positions"* (G).

> *"These backgrounds that we are searching, usually these professions, they don't stay on the queue too long, so I just thought that there is no point for me to put our job ads to the tootukassa"* (E).

> *"We use it just like for just in case platform. There aren't a lot of candidates coming in through that"* (B).

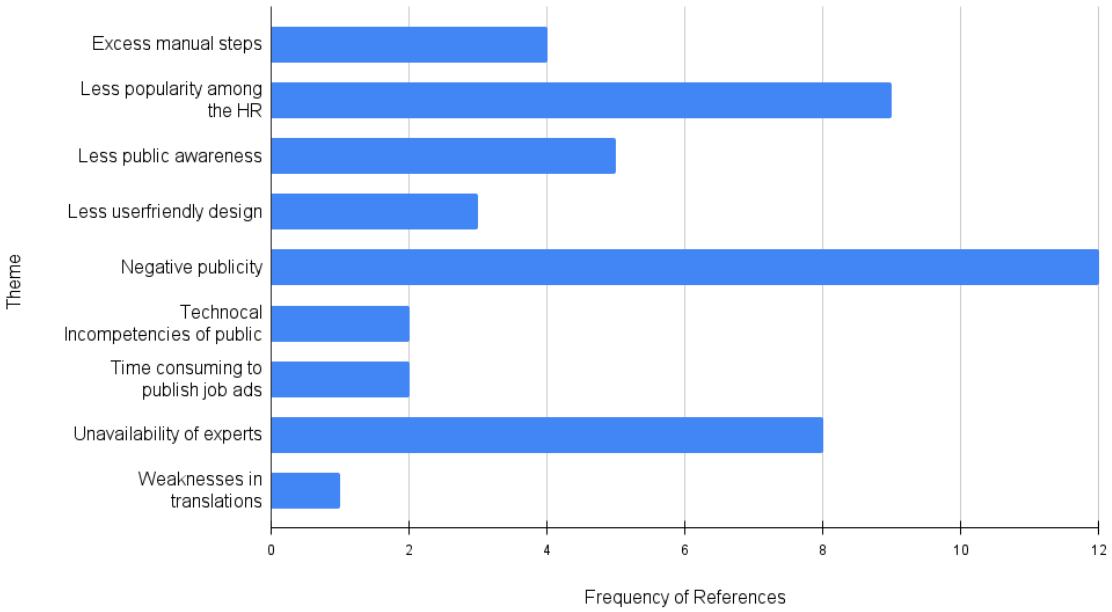

Figure 14: Shortcomings in Existing PES self-service platforms stated by interview participants

4.9. Expectations for future improvements - Results from Expert Interviews

The list of components mentioned by the industry experts who took part in the interviews is displayed in the thematic map below.

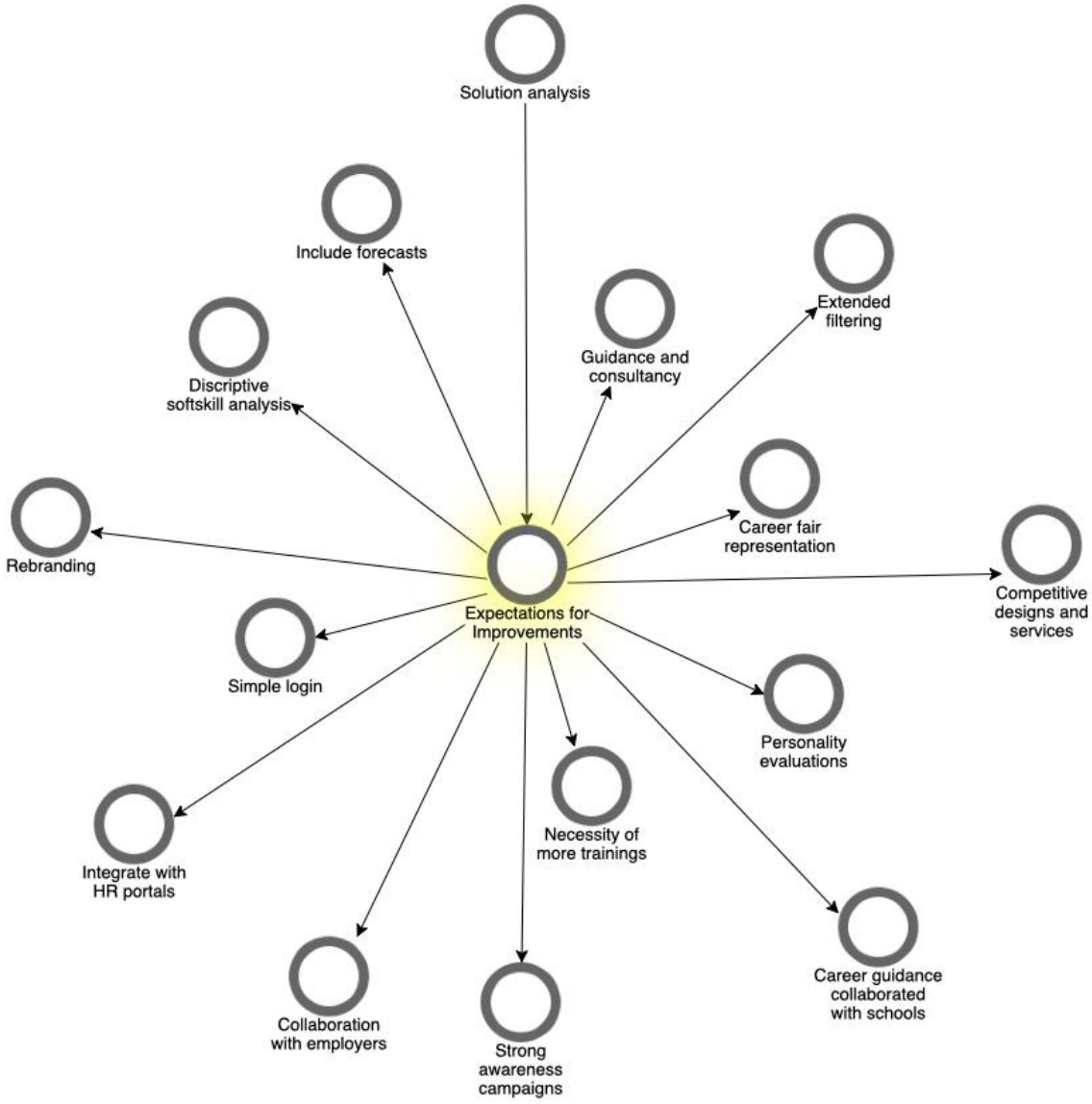

Figure 15: Thematic map of expert expectations of PES self-service platforms for future improvements

Strong awareness campaigns

Subsequently, interviews were focused on exploring the expectations of industry experts from PES self-service solutions using the e-tootukassa self-service platform as an example.

Organizing strong awareness campaigns have been suggested by four respondents repetitively becoming the most frequently referred expected element in the list. One respondent expressed the idea that the platform needs rebranding to eliminate the negative publicity it has earned among the public. A response pointing out the necessity of more awareness campaigns is,

> *"But overall, I know that tootukassa is providing many things. I know that they are doing very good job and I have had friends who have used these trainings and have said that they were very good ones actually. So I know that they do provide, it's just that sometimes I feel that not all people know about this possibility"* (D).

Another respondent discussed that the awareness campaigns should be started from the government level by the education ministry and schools should be a part of this in terms of educating children about these facilities and taking the use of services provided.

> *"I think this may be practical, if it's on the government level, it could be good to address it to this educational minister or somewhere that it spread around schools that there is a public source, that can be used by children"* (C).

Career counselling collaboration with schools

The next suggestion was to establish career counselling to collaborate with schools and universities. Since they are the generation preparing to enter the workforce and could leverage this information to help them make decisions about vocational training and higher education, respondents emphasized the need of educating schoolchildren about the future skill demands and strategically required professions.

> *"I have my kids and they especially this last year, last classes or last years in school then all of them currently are also suffering that. Uh, the kids don't know where they want to go. What they want to study and they'd like everything you know"* (C) one respondent emphasized.

The necessity of more training programs

Following career counselling, the need for more training became apparent as being significant, reflecting the fact that the training programs currently offered in the self-service platform do not have a wider coverage of the demands of the labour market.

> *"When I was talking about the young people, I was having this discussion last week or the week before with the university and we were just discussing the curriculum for a specific field"* (G) one respondent emphasized.

It was additionally pointed out that older generations should have access to adequate training opportunities in order to compete in the labour market with future needs, in addition to the young generation that will soon enter the workforce. The answer stressed the need for reskilling opportunities.

> One respondent said *"It's really good connecting different training facilities and providing for unemployed people or people who are interested in re-skilling them"* (F).

Collaboration with employers

Next, the focus was on developing joint research and development initiatives with the collaboration of the corporate sector in the labour market. The aspect that was underlined was that collaborative research with the corporate sector is the greatest strategy to determine the industry's trending skills and competencies.

> *"This could be like a survey, which indicates how leading companies in the country works and then it's like additional guidance what you should know"* (C). one respondent explained.

Extended filtering

Extended filtering, which enables individuals as well as organizations to search for jobs and potential candidates using specific criteria they are interested in, was the next feature that interviews participants noticed. It was discovered that business professionals prefer headhunting experts for particular positions and would want to search by filtering applicants according to the relevant criteria, such as technologies, languages, experience, location, etc.

Integration with HR portals

The integration of PES self-service platforms with corporate sector HR portals received the following focus. This was suggested to speed up and simplify the job advertisement process. Using the e-tootukassa self-service platform as an example, interviewees pointed out that the system's drawbacks were the time-consuming and excessively large number of steps required to post job advertisements. If they provide a facility to directly share the job posting in the self-service platform as a solution, it will minimize the additional time and effort they would have to expend publishing the advertisement on the e-tootukassa self-service platform.

A module to personality assessment

An expert proposed the incorporation of a personality assessment service so that individuals may recognize their strengths and weaknesses and make choices for resolving problems and improving themselves. The interviewee also emphasized that third-party evaluation tools have already replaced the initial interview as the HR screening process in some organizations, so it would be a good feature if recruitment support platforms could possibly include a personality evaluation service module in the PES self-service platforms as well.

An interviewee provided the following explanation of the use of third-party services for personality assessment:

> *"We usually do those screenings in different ways, so we have the AlvaLab tests that we use to identify personalities. So when recruitment starts and we have a job ads coming in, we have the first step checking those personality tests, we send it automatically to good candidates for this AlvaLab test. Then after the personality*

test is conducted, we look on the candidates again from the skill perspective. And now we have this personality input. And then we decide whom should we approach by different exercise" (C).

Along with the previously mentioned, most commonly discussed elements, a few additional areas were proposed for improvement. The full list of expectations is noted in the table below along with the frequency of the references pointed out by interview participants.

#	Theme	Description	Number of Interviews	Frequency of References
1	Career fair representation	Both in-person and online career fair opportunities to connect employers and candidates	2	2
2	Career guidance collaborated with schools	Career guidance should be focused on kids starting from schools	3	9
3	Collaboration with employers	Collaboration with employers to find out demanding skills, technologies, training modules. Research (surveys) should be done to identify the real-time industry demands	3	7
4	Competitive designs and services	Designs should be simple, clear, and attractive to both candidates and corporate users	2	2
5	Descriptive soft skill analysis	There should be a module introduced to identify and filter out soft skills of the candidates available.	1	1
6	Extended filtering	Filtering possibility by skills, fields, experience, and different variables	4	6
7	Guidance and consultancy	More opportunities to receive guidance and consultancy should be enabled	3	4
8	Include forecasts	Include forecasts of skill demands, job opportunities, and prepare training opportunities based on the future forecasts	2	2
9	Integrate with HR portals	Make it easy to publish, edit, delete job ads	3	5
10	Necessity of more trainings	The necessity of more training programs covering a wider range of industry disciplines. This could be done with the collaboration of	5	8

		schools, universities, and other education institutes		
11	Personality assessment	Introducing a new section for personality evaluations	3	3
12	Rebranding	Rebranding should be done to eliminate the negative publicity among the public	1	2
13	Simple logins	The login should be a simple process such that people are encouraged to use the platform more frequently	1	1
14	Strong awareness campaigns	Awareness campaigns should be organized through the education ministry and schools	4	10

Table 3: Full list of employer expectations from PES self-service platforms for future improvements

4.10. Demanding skills highlighted by the interview participants

The next objective of the study was to identify the skills that employers currently value the most. All interviewees acknowledged that certain skills will be in demand depending on job prospects, but they also identified important skill categories that must be developed across all professions and academic fields.

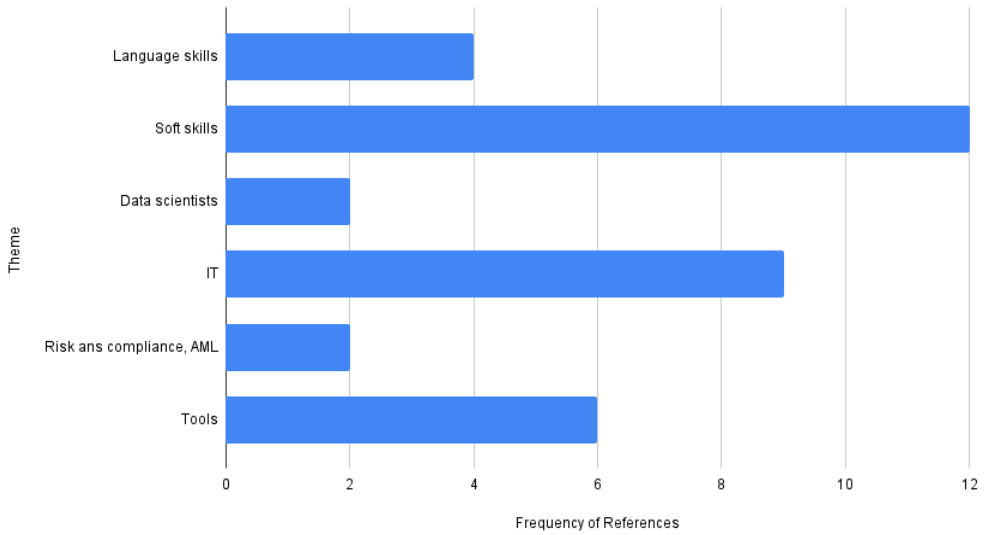

Figure 16: Demanding skill categories mentioned by interview participants

Respondents rated soft skills as being the most important and recommended improving the workforce's soft skills. It was noted that persons who are more tech-savvy tend to be less skilled at forming connections and working in teams. According to the interviewees, younger generations exhibit this more frequently than older generations. The following statements made by the interview participants support the idea that young people's social skills need to be developed extensively.

> *"When they enter the labour market, there are people have less social skills than the generation before. And that means they prefer to type, not talk, and they prefer more, I can't say that they're afraid to communicate, but they have less social skills. And they are, perhaps less prepared psychologically, to enter teams. They are perhaps talking themselves, they're not very expressive"* (G).

> *"The young people are more using these technologies and they are not sometimes able to summarize or provide their own thoughts about things. If you ask them a simplistic question, it's sometimes kick them out of their comfort zone"* (C).

The breakdown of the soft skills listed as needing improvement is shown in the thematic map below.

Figure 17: Thematic map of soft skills to be improved suggested by interview participants

Despite age differences, IT skills were identified as the second most crucial skill that people should develop after soft skills. This encompasses both professionals in the ICT sector as well as general ICT competencies and knowledge. Participants emphasized the need to foster more ICT professionals in the labour market as a result of the changing nature of technology and Estonia's increased emphasis on ICT and a digitalized society. Participants also stressed the need for the general population to have ICT skills in order to use the offered digital services.

Another interviewee made the point that while there should be more training chances for young people to build soft skills, there should also be more possibilities for older people to learn how to use digital services and technologies.

"I would say communication and social skills in for the young people. For the elder generation, there is, of course the technology side and that, you know, people are using more and more computers for day-to-day work" (G).

The frameworks and tools utilized in the corporate sector were placed next in priority. The interviewees noted that it is a recognized reality that certain organizations use a specific collection of tools, software, or frameworks and that recruiting people with experience using those products is challenging. They went on to say that shortening the learning curve and boosting production would both be highly beneficial if they had the chance to hire employees with prior expertise. The respondents also stressed that this should be addressed through joint research with the corporate sector, that information should be made public, and that training opportunities should be made available to those who show an interest.

Language skills were assigned the next highest value while English and Estonian language abilities were mentioned as being significant in the labour market in Estonia. Due to the popularity of international corporations and the high number of foreign experts attracted to Estonia, English was used more frequently than Estonian in references. More language training with a focus on improving both theoretical and practical components was suggested. AML, Risk and compliance, and Data science were mentioned by the interviewees as the next most popular professions and skills in Estonia. The following table shows the frequency of references to each element in soft skills cited by the interview participants.

Soft Skills	**Number of Nodes**	**Frequency of References**
Adaptability	3	5
Being proactive and Independent	1	1
Being self-organized	1	1
Comprehension and ability to explain	3	4
Interpersonal skills	2	3
Leadership	3	4
Learning attitude	1	2
Ownership and responsibility	2	3
Teamwork	4	7

Table 4: Frequency of references each element in soft skills were cited by the interview participants

4.11. Trends and Characteristics of the Present Labour Market - Results from Expert Interviews

The interview's subsequent objective is to determine the characteristics and trends that have been seen in the current labour market. Although the purpose of this was to learn more about the situation in Estonia, participants were also encouraged to discuss the current state of worldwide in general.

High demand for IT professionals

All seven participants mentioned the high demand for ICT sector professionals, which indicates a significant disparity with other elements in the list and suggests that the nation would need to produce more IT specialists to meet future labour market demand. Among the respondents, one said;

> *"Estonia will focus for next 5 or 10 years. How would you like the boost/ upscale in terms of IT, thousands and thousands and thousands people. So In that sense, skills related to ICT is the main gap. Yeah, I see at the moment if this digitalization spreads everywhere. I think, but it's very, very intensely needed because we're small country"* (F).

Continuous learning

Frequent shifts and the expansion of technology in society could be the key factors encouraging continual learning. Employees engage in continuous learning to stay up to date in the job market and to remain competitive to pursue better opportunities, and employers also support continuous learning because having knowledgeable and up-to-date employees can have a positive impact on the organization's future. Supporting continuous learning has also evolved into a component of an organization's competitive advantage. A few of the interviewees mentioned that their companies encompass programs in place for staff upskilling, and it was observed that some companies allot educational budgets to each employee, so they are able to compensate for any professional training courses they choose to enrol in.

Values over money

The participants' consideration of values over money has also increased, demonstrating that the current workforce does not prioritize financial security when seeking employment instead carefully considering opportunities for growth, team dynamics, organizational technology, and most importantly, the stability of the organization. The respondents also note the increased frequency of layoffs observed in the labour market, which has led candidates to think carefully before joining an organization.

Economic concerns

Interviewees discussed how issues like inflation, high-interest rates, and regulations can have an impact on the labour market. Higher remuneration expectations were consequently recognized as a major issue that companies confront when hiring new employees. The impact of current geopolitical circumstances was also mentioned as a factor affecting the labour market.

Higher attention to soft skills

Then it was discovered that employers place just as much emphasis on candidates' soft skills as they do on their technical ability. Technical skills can be trained, but soft skills are more challenging to teach, according to one interviewee, who stated,

> *"Even though the person is very much technical and very competent on that technical aspect, we don't recruit that person, if there is someone which, let's say less technical competency with the best matching to the company culture and the team. So that we really consider because the attitude, I believe the attitude is almost everything"* (A).

Interdisciplinary career switching

Interdisciplinary career switching was another factor highlighted by the interview participants describing the will of people to learn new skills and start a totally new career. One interviewee explained that this tendency is not just seen in younger generations, but also

in adults in their middle ages who are showing interest in switching to professions with higher demands.

> *"And also last thing I wanted to mention is that now there are a lot of candidates who have worked in one position for example, pharmacy or being like a student for this doctor or something like medicine, they start to change completely. They take those courses in IT and they come to IT industry. So I have now faced during this half a year, three such candidates who have decided to switch the area and career they worked. So one case, I was surprised it happened on 35 years old that you decide to do something completely different and decide to do IT since it's very popular and everyone understands that it will come to their lives, They are switching towards something which is again trendy and can be maybe paid better"* (C).

People's tendency to change jobs frequently is another characteristic that has been discussed along with switching careers. Some people view it as a hindrance to their professional development and prefer to switch job opportunities.

Less importance to certificates yet higher importance to the knowledge

According to the experts who took part in the interviews, it was determined that modern generations have developed a tendency to self-learning and build up demanding competencies but do not focus on acquiring suitable diplomas from academic institutions. Three out of the seven interviewees cited this trend based on their personal experiences, and they acknowledged that if they have the necessary skills despite their lack of academic credentials, they should also be offered employment possibilities.

> *"Sometimes we see people have experience in the area or that industry, but they don't have the required professional certificates, so that's of course fine in our area because we don't really consider the bachelor level or masters level degrees as a requirement. So for instance recently we recruited some people who don't have a bachelor's degree or something like that. So we assess those candidates based on their skill set and experience"* (A).

High demand for short-term intense courses

Another interviewee supported the idea and said it was crucial to create a platform for them to apply for a proper certificate, if not at least by enrolling in an intensive training program, because they could be excluded from some companies considering they didn't meet the academic requirements listed in the criteria.

> *"Because some companies don't consider such professional requirements but some companies, they filter out the applications based on those criteria like having a bachelor having a master or things like that then I would say it is a disadvantage for the candidates"* (A).

The interviewee brought up the idea of adding more intensive courses, saying that demand for short-term courses has grown as a result of people's potential time constraints while enrolling in long-term programs due to their personal commitments.

Best Industry experts do not hunt jobs

Another characteristic of the labour market identified by the interview participants was that the best professional experts are not usually interested in searching for jobs, yet recruiters should have to find them and persuade them to take new opportunities in the market. According to one of the interviewees,

> *"Usually the best candidates are already working in the similar job post and we basically want to attract them to apply. They are very up to date what is going on now in their sector or they're actively working in the same kind of field. So basically we want to an active person to apply"* (G).

Remote working being more popular

The current workforce's increased interest in remote work is another factor that interviewees brought up repeatedly. Although initially, companies did not favour remote work that much, they are now more open to it, particularly in light of the COVID-19 situation, according to

interviewees. In other cases, the flexibility of remote work has also assisted in resolving the issue of finding staff for jobs in remote places.

People would rather not choose certain job categories than be unemployed.

Participants in the interviews also noted the difficulty that people do not desire to work in particular job categories and instead chose to remain unemployed until they discover a position they appreciate. The fact that there are so many individuals who are unemployed despite the fact that there are numerous prospects for various jobs in the economy, has had a detrimental impact on the labour market, according to one respondent.

One respondent also provided an example outlining how every year, the lack of workers for seasonal occupations generates news headlines but they still struggle to fill the positions.

> *"People are telling all the time that we don't have enough people and now we are already approaching to the spring and summer time again and during these periods we need lots of additional people here to work in the strawberry-like fields and these form stuff as well. And every summer I hear exactly the same thing that they don't have enough people and it's not very easy to bring people from other countries here for this specific time and it happens every year and every year"* (D).

Another problem mentioned by a respondent is that as the population ages, certain job categories experience a shortage of workers since the next generation does not want to move into these industries.

> *"There are a lot of companies who need sewing people and this is more of a problem. With the new trends in the labour market the problem is that the people who are currently doing the work are going to retire and no young people are coming to fill the positions"* (G).

The complete list of trends and characteristics in the current labour market is shown in the following table along with the frequency of the references cited by the interview participants.

#	Theme	Number of Nodes	Frequency of References
1	Continuous learning	6	20
2	Economic concerns and Regulations	3	12
3	High demand in IT, Data and data security	7	30
4	Values over money	3	13
5	Higher impact from Geo-political situations	3	3
6	Personality testing tools being popular	2	3
7	Interdisciplinary careers switching	4	6
8	Layoffs	3	4
9	People would rather not choose certain job categories than be unemployed.	1	1
10	Remote working being more popular	2	2
11	Seasonal positions are understaffed	1	1
12	Soft skills being more important same as tech skills	5	9
13	Some professions become less interested and understaffed, yet important to the society		1
14	Best industry experts do not hunt jobs	2	3
15	Focused more on materialistic benefits	1	3
16	High demand towards short term intense courses	1	2
17	Job is no longer the first thing in the life	1	2
18	Less importance on the appearance and impression	1	1
19	Less important to certifications but high importance to knowledge	3	4
20	New generations show achievements, projects, and initiatives in addition to certifications	2	2
21	Tech savviness increase weakness in communication	1	1
22	Time limitations and lifestyles prevent people from learning.	2	2

Table 5: Trends and characteristics in the current labour market discussed by interview participants ordered by the frequency of references

4.12. Challenges in the labour market - Results from Expert Interviews

The ultimate goal of the interview was to discuss with the participants the challenges frequently encountered in the labour market. The most common barrier mentioned by respondents was the difficulty of getting experts in particular subjects, while one respondent pointed out that the solutions to overcome this challenge could be;

i) automate as much as possible in the fields it is applicable
ii) outsource to other countries where capacity is available
iii) train more people and build the capacities

The lack of ICT specialists was also emphasized as a clearly visible concern considering the demand in the Estonian labour market.

The next change cited most by the respondents is the difficulty of soft skills and competencies of candidates. It was also discussed that soft skills have been given a higher recognition by the present employers and along with that they have suggested their willingness to have a personality assessment and soft skill assessment modules in recruitment support platforms. One interviewee stated that;

> *"In a couple of times I have failed, especially soft skills, meaning that I have thought that this person can manage working with other people and lead some type of projects or negotiate or so on and so on. But it appears that person cannot do that. They said I am hiring some project manager. He or she might be good in numbers. But she cannot manage the whole environment like the communication between people. Yeah. Even though she or he can be good with deadlines if it's networking and communication part is missing when in many times it has been a problem. So may be these are challenges because with technical stuff, I think mostly we have some tests we prepare for a person who wants to join my team. So we can see the technical skills but not the soft skills. Let's say the first impression might be one, but if you start working, then you see that actually it's not the same. So I think measuring and understanding this soft skills is the most tricky part"* (F).

One of the respondents also mentioned the challenges of recruiting professionals from other countries due to the shortcomings in the relocation and support systems. Even though experts

are willing to accept the employment opportunity, the interviewee claims that they frequently turn down the offer due to a lack of other support services in the country, such as fast visa processing, employment opportunities for family members, school availabilities for kids, and family doctors who speak English.

Next, as challenges companies face in the labour market, high salary expectations and competition in the hiring process were brought up. It was emphasized that timely decisions should be made throughout the hiring process because candidates tend to accept job offers quickly if they come across a satisfying opportunity at a rival organization. It takes time to go through the procedure again with a different applicant if the organization was unable to sign off on the chosen candidate. Additionally, respondents complain that despite their lack of expertise, younger generations in particular have high salary expectations. One respondent explained;

> *"The other point is definitely the salary expectation that even juniors coming fresh off the school are already expecting quite high salaries. Even though they don't have the experience yet"* (E).

Another interview respondent stressed that this might be taking place as a result of the "overconfident" mentality of the modern workforce in the present.

The full list of challenges observed in the present labour market discussed by the interview participants is shown in the below table.

#	Theme	Number of Nodes	Frequency of References
1	Candidates looking for latest technologies	1	1
2	Competitiveness in the recruitment process	2	4
3	Consultants having system knowledge but hard to combine with specific business knowledge	1	1
4	Costs related to relocation of experts	2	2
5	Different maturity levels within the same age range	1	1

6	Difficulty in finding experts in specific disciplines	6	12
7	High salary expectations	2	3
8	Less availability of skilled IT professionals	6	11
9	Receiving a lot of irrelevant applications	1	1
10	Recognising soft skills and competencies of candidates	4	7
11	Relocation challenges based on the weaknesses in the support systems	3	4
12	Time criticality and relocation delays	2	2

Table 6: Challenges observed in the present labour market discussed by the interview participants

5. Discussion

The author will discuss the findings and offer recommendations with regard to the research's potential future in this chapter.

5.1. Discussion

The study uses the Estonian Tootukassa self-service platform as a use case to analyse the present situation of digital public employment self-service provision (PES). The theoretical framework showed how the technology acceptance model (TAM) could be applied in similar studies and following that the inductive method was applied to the research in order to identify the answers to the research questions. The study's analysis of how digital service delivery of public employment services might be improved further and the research gap that exists from the standpoint of clients (candidates and employers) was summarized in the literature review. The role of public employment services and recommendation systems in addressing future skill demands in the labour market was thoroughly covered in the literature review. The literature review also considered how the COVID-19 epidemic affected the labour market and how digital public employment services might help to address the discrepancy in skills in the international labour market.

In order to discover the answers to the research questions, interviews, and survey results are discussed in this chapter. The first three sub-questions of the survey were meant to examine client challenges, client awareness of available PES digital self-service solutions, and client expectations for future improvements. Responses from 176 survey respondents were analysed in the study. In order to find answers to the third and fourth sub-questions, which aimed to discuss the expectations of employers from the PES self-service platforms and characteristics as well as the challenges they identify in the current labour market that may have an impact on the design and provision of digital public employment services, interviews were conducted with seven industry experts who were well experienced with the recruitment and skill demands in the job market. Participants in the interviews represented experts in the HR and management consulting fields, the financial sector, the academic sector, and the software development industry. Recommendations for PES solution design and

improvement will be given following a complete review of the findings and resolution of the intended research questions.

SQ1: What is the level of awareness and utilization of digital public employment self-services among people living in Estonia?

According to the results of the study, both employers and job seekers exhibit a low degree of knowledge about Estonia's e-tootukassa PES self-service platform and other comparable solutions. The key elements that have affected creating a distance between the services and beneficiaries were recognized due to negative reputation, unawareness of existence, and unawareness of the services offered by the platform. The public has a tendency to think that because the e-tootukassa, is administered by the Estonian Unemployed Insurance Fund (EUIF), the services are primarily intended to benefit the unemployed only. To have the concept accepted by the general public, the service's ambitions must be made clear. This is discussed by Larsen and Vesan, who claim that the negative reputation for PES stems from events that occurred in the UK in 1930, commonly referred to as the "dole-queue-image," which claims that people who come to PES seek social benefits rather than obtaining employment [83]. This clarifies the reason why PES ecosystem rebranding and awareness initiatives are essential. Rebranding and increased public awareness initiatives are required to introduce the PES concept to the general public with the goal of eradicating its adverse reputation and elevating its level of acceptance to that of a fundamental public service.

According to the study, word-of-mouth advertising is currently the most effective form of publicity, and social media, employer organizations, mass media outlets, and public service canters like healthcare facilities have all contributed significantly to expanding awareness of PES availability and the opportunities it creates. This can be taken into account when planning future service awareness and advertising campaigns.

Additionally discovered is the need for the awareness campaign to include school-age children. Along with the national digital agenda, this should be started with the collaboration of the education ministry and the EUIF. Recognizing the significance of guiding young people who will soon be entering the workforce is fundamental.

According to the survey, employed respondents are more interested in lifelong learning than unemployed respondents who have responded. The general public may be well-prepared to accept PES digital self-service solutions for the goal of upskilling and reskilling, corresponding to this evidence. The study also demonstrates that people are more interested in obtaining work and upgrading their skills than they are in receiving social benefits from an unemployment insurance fund. This is an excellent example of the significance of PES self-service solutions and how much society could benefit from them.

By analysing the popularity of the e-tootukassa self-service platform in Estonia, it was determined that despite the public's interest in upskilling and reskilling, neither upskilling nor job searching has been popular community activities on the platform. Additionally, it was discovered that LinkedIn and CV.ee are the two most widely used platforms for recruiting in the Estonian labour market. Employers and recruiters anticipate that PES's digital platforms will meet these same standards and, when possible, make comparisons. Furthermore, it was discovered that the lack of experts on PES self-service platforms discourages recruiters from posting job openings or actively seeking candidates through PES platforms.

This demonstrates the significance of analysing the challenges experienced by potential clients of PES digital platforms and determining what measures could be taken to address the improvements.

SQ2: What are the challenges job seekers face to use digital Public Employment Self-Services (PES) available in Estonia?

While the majority of candidates who enrolled in training courses completed the program, it was discovered that a certain percentage did not due to a number of unsatisfactory reasons, including scheduling rigidity, out-of-date curricula, and inexperienced tutors. In order to increase the value and distinction of the digital PES self-service platforms to its potential customers, it is important to focus on developing a complete system with a pragmatic service structure.

The Estonian e-tootukassa platform received a grade of 4 on a scale of 0 to 5 for customer satisfaction, which indicates that customers are more satisfied with the facilities that are currently offered even though there is still room for improvement.

The likelihood of acquiring a job has been demonstrated to be higher for candidates who maintain updated resumes and finish training programs than for candidates with out-of-date resumes and dropouts. This might be an endeavour to encourage applicants to have active accounts and frequent platform interactions. It further offers guidance to PES providers on how to raise the quality of the services by maintaining current, industry-specific curricula and corporate with well-experienced tutors, which is essential to regaining the public's trust in PES provision.

The survey prompted the study to identify the key issues raised by job seekers, including limited employment opportunities, weaknesses in the aspects of user-friendly design, platform simplicity that could be improved, limitations in the information's reliability and quality, language translation limitations, sessions that frequently expire, and not being able to explore platform training options available.

SQ3: What are the expectations of job seekers and employers from digital Public Employment Services?

It was noticed that people compare the PES self-service platforms with other available, competing solutions on the market. It is important to make improvements to services in order to compete in the market by offering an outstanding package of services. The study also discovered that people prefer to have existing features fine-tuned over adding novel functions to existing platforms.

In order to persuade companies to post more job openings on PES's digital platforms, which is currently viewed as a time-consuming and comprehensive process, it is also essential to add more interactive elements, like cross-platform compatibility with quick CRUD features (Create, Read, Update, and Delete). This may improve interaction and make PES platforms more frequently utilized by HR departments.

The survey also discovered that, from the viewpoint of clients, job seekers prefer PES self-service platforms that provide a mobile application, incorporate pay ranges, publish an e-newsletter, and display consultant photographs in order to personalize the interactions.

Since it can be helpful to its clients to identify their own personality types and identify what might be more suitable for them to learn in order to make a future in accordance with the skill demands, it is recommended that descriptive soft skill analysis and personality assessment modules to be introduced to PES digital platforms.

Personality tests would be advantageous from a recruitment standpoint if they were to take the place of the third-party tools that employers use to assist with hiring. When hiring for technical fields like IT, it was noticed that these third-party assessment tools had taken the place of initial HR screening interviews. In order for recruiters to be able to extend their filters to details level searches while they are looking for candidates for the vacancies, extended filtering options should be improved in the PES digital platforms.

Since some respondents argue that technical skills are able to be trained but soft skills aren't, soft skills have received more attention than in the past. It has been noted that the current job market places more emphasis on finding applicants who have the ideal mix of technical and soft skills. Therefore, it's crucial to add soft skills development modules to the PES self-service training materials. It was also discovered that out of the demanding talents presented by the study's participants, soft skills come out on top, followed by ICT and technical skills.

Both online and in-person presentations are essential and desired by applicants as well as recruiting companies, who recognize the value of career-fair representation. Since physical representation makes it simpler for recruiters to determine soft skills than online interactions, it appears to be more interactive and engaging.

Adding a forecasts module would bring more value and help the digital platform achieve its goals since clients who plan to enrol in training courses may fundamentally investigate the trend of future skill demands and make decisions based on their skills, interests, and demand.

It is also acknowledged that novel training courses should be added to PES self-service platforms and that this would be appropriate following a cooperative study with

organizations in the labour market. It is crucial to identify the training for particular tools, frameworks, or technologies that could be demanding from a practical standpoint.

SQ4: What are the characteristics of the modern workforce in the context of the Estonian job market?

The study's final goal was to identify the trends and characteristics of the current labour market that might influence the creation and implementation of PES self-service platforms. It was discovered that the labour market is competitive and that there is a growing demand for IT professionals. This prompts authorities to create more training modules to increase the labour force's IT competencies. Even while there is greater demand for some occupations, it is evident that there is a shortage of experts in fields where more education and experience are required.

Furthermore, it was noted that modern professionals place more emphasis on knowledge and self-improvement than on training certifications, which can sometimes make them less competitive in the job market in the absence of legitimate academic credentials. Another trend in the labour market is that people are choosing short-term intensive courses over long-term comprehensive training programs in order to gain the knowledge they need promptly due to their busy lifestyles and other commitments. When creating training modules for the PES self-service platforms in the future, decision-makers should focus on these areas as well.

Paying more attention to values over money is another distinct trend that has been identified. Candidates appear to appreciate the company's values, goals, prospects for advancement, organizational technologies, procedure, culture, and stability in addition to the compensation package.

The contemporary labour market has a high rate of interdisciplinary career switching, which immediately calls for greater training opportunities for individuals to develop. This should be taken into account while creating additional training programs and platforms so that they can participate in such possibilities. This has previously been discussed by Sultana and Watts in their paper on career guidance in PES across Europe, where they found that in several countries (such as Greece and Poland), personalized employment services are only available

for those who are currently unemployed, whereas those who are employed may also be able to take advantage of the PES facilities [84].

Another significant finding of the study is that industry professionals do not appear to be particularly enthusiastic about searching for work; rather, they will consider if an opportunity arises. The interviewees who work in employee recruitment have noticed this pattern, and they emphasize the value of having a headhunting option in platforms for approaching experts associated with these personalities.

It was also apparent that more people are choosing to work remotely, which, in the opinion of some applicants who prefer remote work, has a strong relationship with other work-life balance-related aspects. On the other side, it is debatable if working remotely can also reduce productivity. Regarding the high preference for distance learning, it was mentioned in the interviews that this approach cannot have a greater impact on the development of soft skills, which require more interpersonal communication and teamwork.

Another trend that was found in the study was people's tendency to avoid particular job categories rather than being unemployed. This can be investigated further to determine the potential for creating training programs to address the gaps in the job categories that are understaffed in the labour market.

5.2. Recommendations

Based on the research's findings, the graphic below *(Figure 18)* outlines the specifications for streamlining the ecosystem for training recommendations for upskilling and reskilling. The diagram describes the success factors of the Public Employment Services (PES) ecosystem based on consumer demand from the perspective of job seekers and employers in a labour market. The study employed the Estonian e-tootukassa platform as a use case. However, the findings are potentially applicable to a broader range of countries within the entire PES ecosystem, with opportunities for future research to validate the results across different nations.

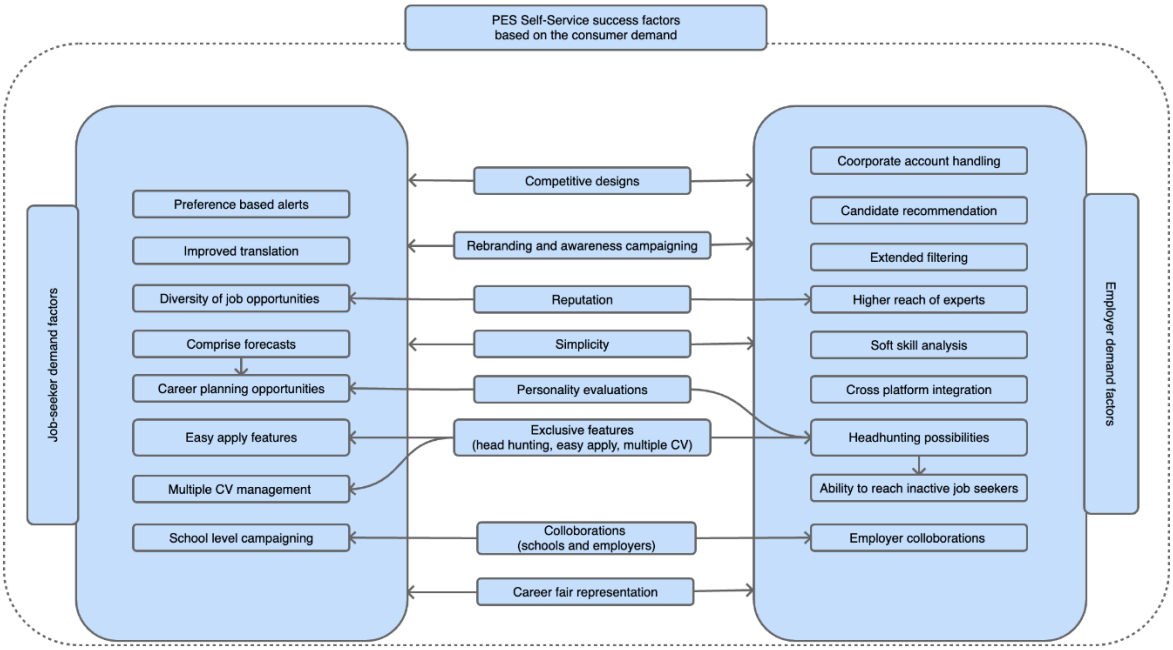

Figure 18: PES self-service success factors based on the consumer demand

6. Summary and Conclusion

The objective of this thesis was to figure out how to make digital public employment self-service platforms more interactive and engaging for both organizations and job seekers. A survey that was distributed to the general public in Estonia to gather ideas from the perspective of job searchers and a series of semi-structured interviews to gather ideas from industry specialists from the organizational standpoint were the foundations of the study. The survey had both quantitative and qualitative components, and the interviews provided the study with qualitative data, leading to the adoption of a mixed methodological paradigm for the study. To gather accurate and non-biased data from respondents who represented both the local population and the international groups residing in Estonia, the survey was made available in both Estonian and English languages.

The method for doing the research was an inductive approach. Since there is insufficient literature on the subject, the inductive approach is preferable to the deductive approach, which is appropriate in situations where the goal is to test an existing theory. Four sub-questions were created with the intention of obtaining information to address the major research topic. In order to identify issues and potential improvements that might be present in similar PES self-service systems, the Estonian e-tootukassa self-service platform was chosen as the case study for the investigation.

The first sub-question examined information on Estonia's level of awareness of and use of digital public employment self-service platforms. The second sub-question attempted to understand the difficulties that job searchers encounter on the Estonian e-tootukassa platform and to identify any recommendations that may be applied to other platforms of a similar nature. The third sub-question sought information about PES self-service platform expectations that could be used to guide similar platform designs and future advancements. The fourth and last sub-question sought information on trends and characteristics that might be widely observed in the current labour market and could have an impact on the development and implementation of PES self-service platforms. The first three sub questions of the study were meant to be answered from the standpoint of job seekers, and the third and fourth sub questions were meant to be addressed from the viewpoint of employers. For the survey, 176 responses were gathered and analysed, and seven interviews with business

professionals working in recruitment for management and HR coordination positions were conducted.

Findings demonstrated that regardless of whether candidates were employed or not, there was a high level of public readiness to use PES self-service platforms and evidence of motivation for lifelong learning. Additionally, it was discovered that candidates who are interested in receiving such training need to have access to more intensive training opportunities. The authorities should focus on giving people the chance to look for training opportunities on their own without incorporating a consultant and giving them the chance to enrol in training programs even if they are employed candidates, given the high level of public interest in upskilling and reskilling and Estonia's human capital capabilities. In self-service platforms, simplicity and understandability also hold a significant amount of value. The primary steps that authorities should take to bring the notion closer to the people were identified as eradicating adverse publicity among the general public and introducing more awareness programs. Collaborations with educational institutions and organizations should be made in order to increase awareness and identify the practical and real-time competencies that employers are looking for.

The thesis developed guidelines for streamlining the ecosystem for training recommendations for upskilling and reskilling based on the findings of the research. The recommendations sub chapter identifies and presents *(Figure 18)* the success factors of the Public Employment Services (PES) ecosystem based on consumer demand from the viewpoint of job seekers and employers in a labour market. Within the full PES ecosystem, conclusions may be applicable to a wider range of nations, with opportunities for further study to validate the findings in many countries.

6.1. Limitations of the Study

Only 60 of the 176 respondents in the study who responded to the survey have used the e-tootukassa platform, which was used as an example for the analysis. The study's significance would increase if there were more respondents with platform experience. It is also important to reach people who do not have access to participate in online surveys and have language limitations.

The seven interviewees represented leading financial institutions in Estonia, two top software development and ICT service providers, a human resource consulting firm, and the School of Information Technologies at Tallinn University of Technology, all of which operate in the ICT sector. It would have given the study more credibility if the author had used interviewees who represented a variety of professions and fields on the job market.

6.2. Prospects for Future Work

The current thesis provided a comprehensive review of the considerations that should be made while designing and improving digital public employment self-service platforms from the perspectives of organizations and job seekers. The study covers a broad range of topics, including challenges, expectations of PES self-service platforms, and characteristics of the labour market, and there is still room for additional research to analyse each of these topics in depth and suggest measures to address, design more advanced solutions, and enhance existing services. The analysis of employment options for people with disabilities and the development of PES solutions for them was not a primary focus of this research, but these topics need to be explored further.

Additionally, the study identified some areas that are unrelated to the study but indirectly affect the success of PES ecosystems, such as designing training modules and support systems for relocating experts needed in the labour market. Further research should use the gained knowledge as a pilot study and expand the similar study to a broader range of stakeholders in Estonia and in EU countries, targeting organizations and jobseekers with specialized online surveys.

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Appendix 2 - Survey Questionnaire

Data category / Research question	Question type	Survey question	Answers provided
Demographic data collection	Radio button	**01.** Please enter your current country of residence	Country list sheet
Demographic data collection	Radio button	**02.** What is your country of origin?	Country list sheet
Demographic data collection	Radio button	**03.** What is your relationship with Estonia?	I was born in Estonia / My parents are from Estonia
			I came to study in Estonia
			I came to work in Estonia
			I came with my family
			Other (Text)
Demographic data collection	Radio button	**04.** Please indicate your age category	Below 15
			15-24
			25-34
			35-54
			55-64
			Above 65
Demographic data collection	Radio button	**05.** Please select your highest education level	Primary education
			Vocational education only
			Secondary education
			Secondary education + Vocational education
			Bachelor's degree
			Master's degree
			Doctorate
Demographic data collection	Radio button	**06.** Which situation describes you best?	I am a student
			I am currently employed
			I am currently employed but looking for another job
			I am unemployed and looking for a job
			I am unemployed and I do not look for a job
			I am an entrepreneur

			I am a volunteer
			Other (Text)
SQ1 (Awareness)	MCQ	**07.** From the following, please mark the public employment service (PES) online self-service environments you have used before.	Tootukassa (e-tootukassa)
			Europass
			EURES
			EURAXESS
			Other (Text)
			None of the above
SQ1 (Awareness)	Text	**08.** What was the purpose of using those platforms?	An open-ended question
SQ3 (Expectations)	MCQ	**09.** Which of the following activities are most important for you on such a platform? (Select the top 3 you find as most important)	Assistance to find a new job
			To apply for a monthly allowance from the public employment service
			Assistance to finding suitable training
			Guidance about demanding skills in the near future
			Opportunity to apply to training free of charge
			Opportunity to learn a new skill to switch my job regardless if it is free or not
SQ1 (Awareness)	Y/N	**10.** Have you ever used the Unemployment Insurance Fund (e-tootukassa) self-service environment in Estonia?	Yes / No
If 10=YES>11, If 10=NO>Email and End			
If the participant has used the Tootukassa system before, the following questions will be given			
Background	MCQ	**11.** How many times have you used the e-tootukassa self-service environment?	One time
			Multiple times
Background	MCQ	**11.1** How did you hear about the e-tootukassa self-service environment	From Social media
			From TV advertisements
			From a friend
			From News channels or newspapers
			Other

Background	Radio	**12.** What is your main motivation for using the e-tootukassa self-service environment?	To find a job
			To find a training program to upskill myself
			Other (Text)
Background	Radio	**13.** Please let us know what will drive your commitment to lifelong learning.	I am learning to pursue career development and promotions
			I love to keep learning new things even though it does not directly help in my job
			I do not enjoy the hassle of learning but I need to keep my career safe
			Other (Text)
Background	Text	**14.** How many training courses funded by the Estonian Unemployment Insurance Fund have you taken?	
Background	Y/N	**15.** Have you received any training recommendations from the e-tootukassa self-service environment?	Yes / No
If 15=YES>15.1, If 15=NO>17			
SQ2 (Challenges)	MCQ	**15.1** How did you find training programs suitable for you in the e-tootukassa self-service environment?	My consultant suggested me the program and I agreed to follow it
			I and my consultant together discussed my interests and then they assisted me in enrolling in the program.
			I told my consultant what I wanted to learn and then they assisted me in enrolling in the program.
			Other… (Text)
SQ2 (Challenges)	Text	**15.2** Please explain more about your experience. Eg: How was the process of signing up for the training?	
SQ2 (Challenges)	Y/N	**15.3** Did you complete the training course you started in the e-tootukassa self-service environment?	Yes / No
If 15.3=NO>15.3.1, If 15.3=YES>15.4			
SQ2 (Challenges)	Text	**15.3.1** If your response to the previous question was NO, kindly explain your decision to stop participating in the program.	
Continue to 16 after 15.3.1			
SQ2 (Challenges)	Y/N	**15.4** Did the training program benefit your job search?	Yes / No
YES, NO > 16			

SQ2 (Challenges)	Radio	**16.** Did you find the job opportunity through the e-tootukassa self-service environment or did you find it from another source?	Through the e-tootukassa self-service environment
			From another source
Continue to 17			
SQ2 (Challenges)	Y/ N	**17.** Are you happy with the jobs earching assistance you got from the e-tootukassa self-service environment?	Yes / No
SQ2 (Challenges)	Text	**17.1** Please describe your experience with the e-tootukassa self-service environment service you received.	
SQ2 (Challenges)	Radio button	**18.** How long did it take you to find a job using the e-tootukassa self-service platform?	Less than 1 month
			Between 1 and 6 months
			More than 6 months
			I did not find a job through the e-tootukassa self-service environment
SQ2 (Challenges)	Text	**19.** How many job recommendations you have received per month from the e-tootukassa self-service environment?	
SQ2 (Challenges)	Text	**20.** How many job applications have you submitted from the e-tootukassa self-service environment?	
SQ2 (Challenges)	Y/N	**21.** Do you keep your resume up to date in the e-tootukassa self-service environment?	Yes / No
SQ2 (Challenges)	MCQ	**22.** How frequently do you check the e-tootukassa self-service environment to see what positions are available?	Daily
			Weekly
			Once a month
			Not often
SQ2 (Challenges)	Text	**23.** What challenges have you experienced in the e-tootukassa self-service environment?	
SQ3 (Expectations)	Radio button	**24.** Please indicate your level of satisfaction with the e-tootukassa self-service environment on a scale of 0 to 5. (0- lowest satisfaction, 5-highest satisfaction)	0, 1, 2, 3, 4, 5, N/A
SQ3 (Expectations)	Text	**25.** What aspects of the e-tootukassa self-service environment would you suggest being improved?	
SQ3 (Expectations)	Text	**26.** Please let us know what features you believe are essential for the e-tootukassa self-service environment to be added in the future.	

Küsimustik

Data category / Research question	Question type	Survey question - ESTONIAN	Answers provided - ESTONIAN
Demographic data collection	Radio button	01. Palun sisesta riik, kus praegu elad	Riikide nimekiri
Demographic data collection	Radio button	02. Millisest riigist Sa pärit oled?	Riikide nimekiri
Demographic data collection	Radio button	03. Kuidas oled Eestiga seotud?	Sündisin Eestis / Mu vanemad on Eestist
			Tulin Eestisse õppima
			Tulin Eestisse tööle
			Tulin Eestisse koos perega
			Muu (tekst)
Demographic data collection	Radio button	04. Palun märgi oma vanusevahemik	Noorem kui 15
			15-24
			25-34
			35-54
			55-64
			Vanem kui 65
Demographic data collection	Radio button	05. Milline on Sinu kõrgeim omandatud haridustase?	Põhiharidus
			Kutseharidus põhihariduse baasil
			Keskharidus
			Kutseharidus keskhariduse baasil
			Bakalaureuse kraad
			Magistrikraad
			Doktorikraad
Demographic data collection	Radio button	06. Milline väide kirjeldab Sind kõige paremini?	Olen õpilane
			Hetkel töötan
			Hetkel töötan, kuid otsin uut töökohta
			Hetkel töötu ja otsin töökohta
			Hetkel töötu ja ei otsi töökohta

			Olen ettevõtja
			Olen vabatahtlik
			Muu (tekst)
SQ1 (Awareness)	MCQ	07. Palun märgi, millisete Tööhõiveametite internetipõhiseid iseteeninduslatvorme oled varem kasutanud	Töötukassa (e-töötukassa)
			Europass
			EURES
			EURAXESS
			Muu (tekst)
			Mitte ükski eelnevaist
SQ1 (Awareness)	Text	08. Mis eesmärgiga neid platvorme kasutasid?	
SQ3 (Expectations)	MCQ	09. Millised järgmistest võimalustest on Sinu jaoks selliste platvormide juures olulisimad? Märgi kolm endale olulisimat	Abi uue töökoha leidmisel
			Pakutavale töötutoetusele kandideerimine
			Abi sobiva koolituse leidmisel
			Suunamine ja informatsioon lähitulevikus vajatavatest töökohtadest
			Võimalus kandideerida tasuta koolitustele
			Võimalus õppida uus oskus töökoha vahetamiseks, olenemata sellest, kas seda saab tasuta teha
SQ1 (Awareness)	Y/N	10. Kas oled kunagi Eesti Töötukassa iseteeninduskeskkonda kasutanud?	Jah / Ei
If 10=YES>11, If 10=NO>Email and End			
If the participant has used the Tootukassa system before, following questions will be given			
Background	MCQ	11. Mitu korda oled e-töötukassa iseteeninduskeskkonda kasutanud?	Ühe korra
			Mitu korda
Background	MCQ	Kuidas sa kuulsid E-tootukassa iseteeninduskeskkonnast?	Sotsiaalmeediast
			Telereklaamidest
			Sõbralt
			Uudistekanalitest või ajalehest
			Muu

Background	Radio	12. Mis on olnud Sinu peamine eesmärk Töötukassa teenuste kasutamiseks?	Tööotsing
			Koolitusvõimalused uute oskuste omandamiseks
			Muu (tekst)
Background	Radio	13. Palun kirjelda, mis motiveerib Sind end täiendama.	Õpin karjäärivõimaluste ja edutamiste jaoks
			Mulle meeldib midagi uut õppida, kuigi see otseselt minu tööle kaasa ei aita
			Mulle tegelikult ei meeldi õppida, aga vajan seda, et säilitada oma karjäär
			Muu (tekst)
Background	Text	14. Mitmel Töötukassa poolt tasutud koolitusel Sa osalenud oled?	
Background	Y/N	15. Kas Sulle on Töötukassa poolt koolitusi soovitatud?	
If 15=YES>15.1, If 15=NO>17			
SQ2 (Challenges)	MCQ	15.1. Kuidas Töötukassa koolitust valisid?	Minu nõustaja soovitas koolitust ja otsustasin sellel osaleda
			Arutasime nõustajaga minu huve ja pärast seda soovitas ta mulle koolitusi
			Ütlesin oma nõustajale, mida soovin õppida, ja ta aitas mul koolitusega liituda
			Muu...
SQ2 (Challenges)	Text	15.2. Räägi oma kogemusest pikemalt. Nt: Kuidas koolitusele saamise protsess oli?	
SQ2 (Challenges)	Y/N	15.3. Kas lõpetasid koolituse, millele end Töötukassa kaudu kirja panid?	Jah / Ei
If 15.3=NO>15.3.1, If 15.3=YES>15.4			
SQ2 (Challenges)	Text	15.3.1. Kui vastasid eelmisele küsimusele EI, palun kirjuta, mis oli selle põhjuseks.	
Continue to 16 after 15.3.1			
SQ2 (Challenges)	Y/N	15.4. Kas koolitus aitas Sul tööd leida?	Jah / Ei
YES, NO > 16			
SQ2 (Challenges)	Radio	16. Kas leidsid tööpakkumise läbi e-töötukassa iseteeninduskeskkonna või mõnest muust allikast?	Läbi e-töötukassa iseteeninduskeskkonna

			Muust allikast
Continue to 17			
SQ2 (Challenges)	Y/ N	17. Kas jäid tööd otsides Töötukassa iseteeninduskeskkonnaga rahule?	Jah / Ei
SQ2 (Challenges)	Text	17.1 Palun kirjelda enda kogemust	
SQ2 (Challenges)	Radio button	18. Mitu kuud Sul kulus et Töötukassa kaudu töö leida?	Vähem kui 1 kuu
			1-6 kuud
			Üle 6 kuu
			Ei leidnud Töötukassa kaudu tööd
SQ2 (Challenges)	Text	19. Umbes mitu tööpakkumist kuus said e-töötukassa iseteeninduskeskkonda kasutades?	
SQ2 (Challenges)	Text	20. Mitmele töökohale oled e-töötukassa iseteeninduse kaudu kandideerinud?	
SQ2 (Challenges)	Y/N	21. Kas hoiad oma elulookirjelduse Töötukassa süsteemis uuendatuna?	
SQ2 (Challenges)	MCQ	22. Kui tihti külastad Töötukassa süsteemi uute tööpakkumiste vaatamiseks?	Iga päev
			Iga nädal
			Kord kuus
			Harva
SQ2 (Challenges)	Text	23. Millisete probleemidega oled Töötukassa süsteemi kasutades kokku puutunud?	
SQ3 (Expectations)	Radio button	24. Vahemikus 0-5, palun hinda, kui rahul oled Töötukassa teenustega? (0 - ei ole üldse rahul, 5 - olen väga rahul)	0, 1, 2, 3, 4, 5, N/A
SQ3 (Expectations)	Text	25. Mida sooviksid e-töötukassa iseteeninduskeskkonnas parandada?	
SQ3 (Expectations)	Text	26. Palun kirjuta, mis on Sinu arvates e-töötukassa iseteeniduskeskkonnast veel puudu	

Appendix 3 - List of Survey Pilot Test Users

No	Name of the pilot test user	Contact information
1	Markko Liutkevicius (TALTECH)	Institute of Software Science markko.liutkevicius@taltech.ee
2	Richard Michael Dreyling III (TALTECH)	Institute of Software Science richard.iii@taltech.ee
3	Eric Blake Jackson (TALTECH)	Institute of Software Science eric.jackson@taltech.ee
4	Lakshitha Waidyasekara	Private user lakshithawaidyasekara@gmail.com
5	Hiruni Gunaratne	Private user hirunigunaratne@gmail.com

Appendix 4 - List of Interviews

Interview	Reference of Interviewee	Position	Type of Organization
1	A	Senior Manager, Information Security	A leading software development company, Estonia
2	B	Head of Recruitment, Career Center	A leading financial organization, Estonia
3	C	Team manager-BI Analytics Team 5	A leading financial organization in Sweden and Baltic countries
4	D	Recruiter	A leading software development company, Estonia
5	E	Recruitment Specialist	A leading software development company, Estonia
6	F	Assoc. Prof in Next Gen Government Transformation	A leading university in Estonia
7	G	CEO and HR consultant CEO and HR consultant	HR management consulting company, Estonia

Appendix 5 - Interview Guide

Interviewer: Piyumi Samaranayaka, E-Governance Technologies and Services, Tallinn University of Technology.

Respondent: XXXX

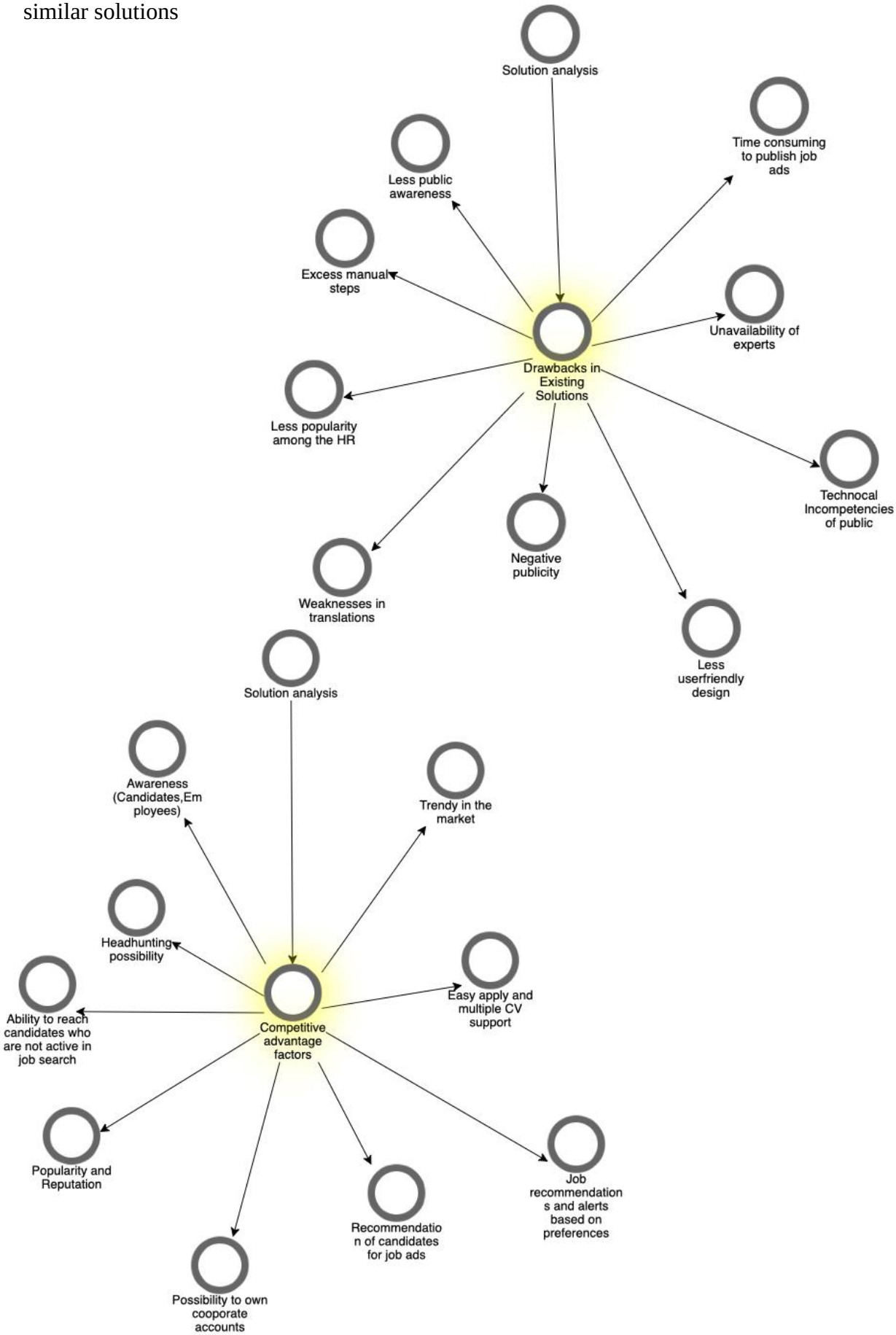
Questions:

Topics	Starting question	Sub Questions
Comprehension	**1.** Please describe your current position and tasks in the job role. **2.** What involvement do you have in the recruitment process?	**a.** How long have you been involved in recruitment activities?
SQ3 - What are the expectations of employers from Public Employment Services?		
Section A	**3.** What resources/channels do you use to find applicants for new positions?	**a.** Please explain the reasons for your choice. **b.** Which one is the best? **c.** What are the pros and cons you have noticed in such channels?
	4. Have you used / Do you currently use the Unemployment Insurance Fund (e-tootukassa) self-service environment of Estonia for recruitment purposes?	**a.** Please explain for what purposes you use/have used the e-tootukassa platform. -To publish job advertisements -To pick matching candidates etc. **b.** Please explain why you do not use the e-tootukassa platform for recruitment activities.
	5. What are your expectations from a public employment service (PES) like e-tootukassa in Estonia?	**a.** What are the most important aspects you value to be in a PES? **b.** Do you see them on the e-tootukassa platform?
	7. Do you have any suggestions on aspects of improving the e-tootukassa platform?	**c.** Do you have any suggestions for improving any PES platforms in general?

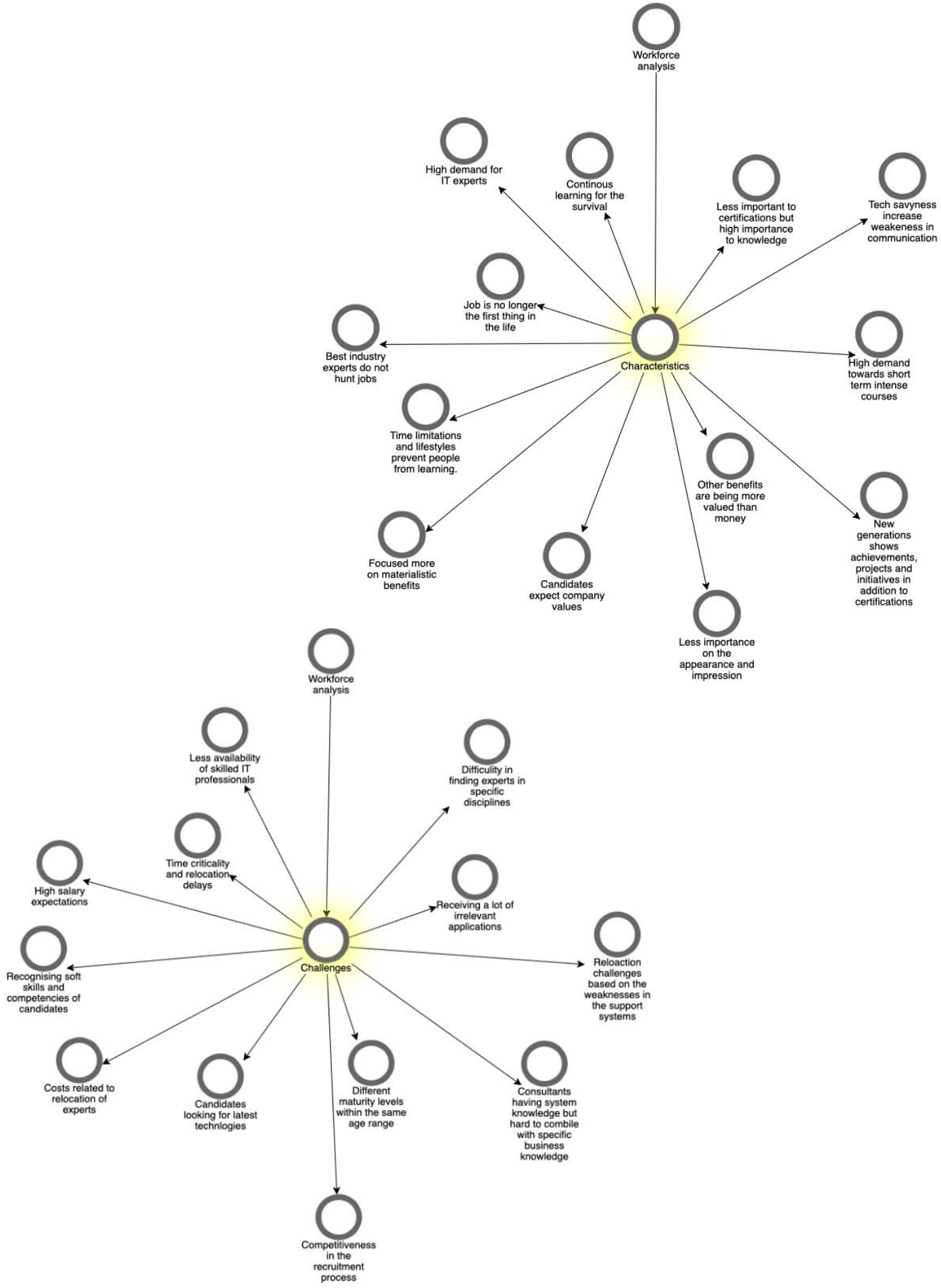
SQ4 - What are the characteristics of the modern workforce in the context of the Estonian job market?		
Section B	**7.** What are the main challenges you notice when finding the right people for the jobs?	
	8. What aspects and characteristics do you value about the candidates in the present labour market?	**a.** How do you see the characteristics of the modern workforce? -Continuous learning -Soft skills -Attitudes etc.
	9. What skills and qualifications are most essential for the current job market as you see?	**b.** Do you see any gaps in skills in the workforce in Estonia? **c.** Do you have any suggestions to address this skill gap issue?
	10. What are the trends you have noticed in recent years which are impacting the workforce?	

Appendix 6 - Thematic maps

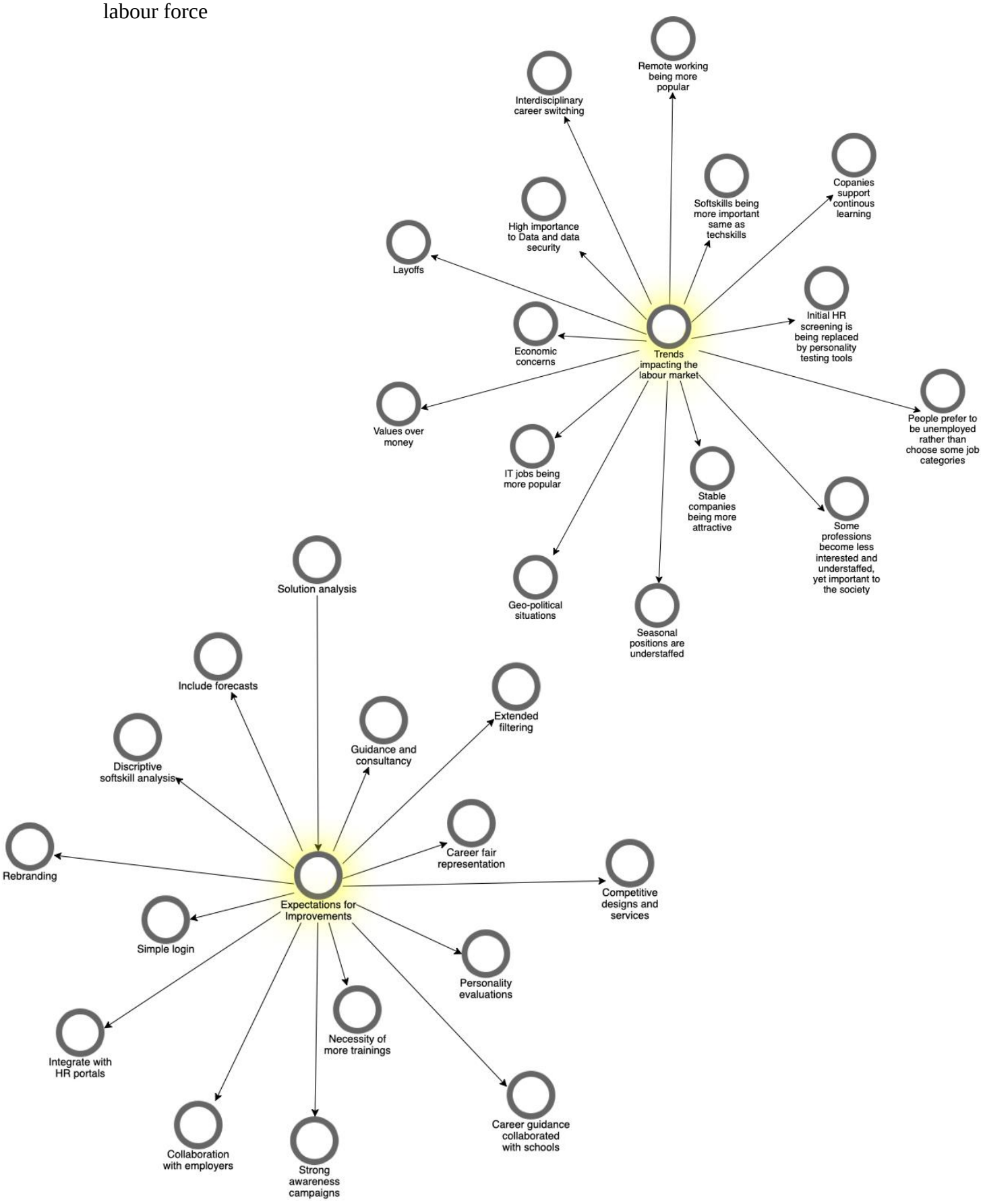
Drawbacks of existing PES self-service solutions and competitive advantage factors of similar solutions



Characteristics of the modern workforce and challenges facing in recruiting skills



Expectations of employers from PES solutions and labour market trends impacting the labour force



Appendix 7 - Interviews Codebook

Name	Description
Demanding Skills	The skills brought up by the Interviewees to improve the workforce
Language skills	
English	
Estonian	
Soft skills	
Adaptability	
Being proactive and Independent	
Being self-organized	
Comprehension and ability to explain	
Interpersonal skills	How to work with people, how to recruit people, how to motivate people
Leadership	
Learning attitude	
Ownership and responsibility	
Teamwork	
Technical skills	
Data scientists	
IT	
Risk ans compliance, AML	
Tailoring	
Tools	Popular tools in the industry
Agile ways of working (frameworks)	
Business objects	
Microstrategy	
PowerBI	
SWIC	
Popular Platforms	Popular application platforms mentioned by interviewees
CommunityEngagements	
CompanyWebsite	
CV Keskus	https://www.cvkeskus.ee/
CV Online (cv.ee)	https://www.cv.ee/et/
e-tootukassa	
EURES	
Facebook	https://www.facebook.com/

Name	Description
HeadHunting	
LinkedIn	https://www.linkedin.com/
MeetFrank	https://meetfrank.com/
Referrals&InternalCandidates	
Teamtailor	https://www.teamtailor.com/
Universities	
Solution analysis	Drawbacks of current solutions, competitive advantage factors with similar solutions and Expectations and possibilities for future improvement is themed here.
Competitive advantage factors	
Ability to reach candidates who are not active in job search	
Awareness (Candidates, Employees)	
Easy apply and multiple CV support	
Headhunting possibility	
Job recommendations and alerts based on preferences	Different users have different preferences based on features and usability factors
Popularity and Reputation	
Possibility to own corporate accounts	
Recommendation of candidates for job ads	
Trendy in the market	
Drawbacks in Existing Solutions	Drawbacks identified through interviews in currently available solutions will be listed under this code.
Excess manual steps	Having to answer a lot of questions and higher amount of manual steps to publish job ads
Less popularity among the HR	Less awareness and less popular among the HR departments towards the current PES solutions (e-tootukassa)
Less public awareness	
Less user-friendly design	
Negative publicity	Existing solutions have negative publicity of catering specifically for the unemployed people (Less awareness of facilities provided by existing solutions).
Technical incompetence’s of public	Less awareness of the public about keywords which should be added such that it gets properly promoted in the platform (CV online)
Time-consuming to publish job ads	
Unavailability of experts	Unavailability of specialized competencies and Experiences among the candidates available in e-tootukassa
Weaknesses in translations	

Name	Description
Expectations for Improvements	
Career fair representation	Both in person and online opportunities to connect employers and candidates.
Career guidance collaborated with schools	Career guidance should be focused on kids starting from schools
Collaboration with employers	Collaboration with employers to find out demanding skills, technologies, training modules. Survey circulation for data collection).
Competitive designs and services	Designs should be simple, clear, and attractive to both candidates and corporate users
Descriptive soft skill analysis	
Extended filtering	Filtering possibility through skills, fields, experience, and different variables
Guidance and consultancy	
Include forecasts	Include forecasts of skill demands, job opportunities, and training opportunities
Integrate with HR portals	Make it easy to publish, edit, delete job ads
Necessity of more trainings	The necessity of more training programs to address the scarcity of skills was brought out. This could be done with the collaboration of schools, universities, and other education institutes
Personality evaluations	
Rebranding	
Simple login	
Strong awareness campaigns	Awareness campaigns should be organized through the education ministry and schools
Trends impacting the labour market	
Companies support continuous learning	Companies encourage employees to continuously development providing training and financial aid as company policies.
Economic concerns	
High interest rates	
Inflation	
Regulations	
Geo-political situations	The war situation
High importance to Data and data security	
Initial HR screening is being replaced by personality testing tools	
Interdisciplinary career switching	
IT jobs being more popular	IT jobs being more popular because of the high demand and better benefits
Layoffs	
People prefer to be unemployed rather	There are some job categories that need more employees

Name	Description
than choose some job categories	meanwhile there are a lot of unemployed people in the workforce
Remote working being more popular	
Seasonal positions are understaffed	Every year, this is noticeable that seasonal jobs are understaffed
Soft skills being more important same as tech skills	
Some professions become less interested and understaffed, yet important to the society	
Stable companies being more attractive	
Values over money	
Workforce analysis	
Challenges	
Candidates looking for latest technologies	
Competitiveness in the recruitment process	IT employees don’t stay unemployed for a long time and companies should act fast to recruit the best ones
Consultants having system knowledge but hard to compile with specific business knowledge	
Costs related to relocation of experts	
Different maturity levels within the same age range	
Difficulty in finding experts in specific disciplines	
High salary expectations	Candidates who don’t have much experience and fresh graduates too expecting the same salary scales same as experienced professionals
Less availability of skilled IT professionals	
Receiving a lot of irrelevant applications	Despite the location, qualifications or skills specified in the job advertisement, candidates keep applying for jobs
Recognising soft skills and competencies of candidates	
Relocation challenges based on the weaknesses in the support systems	Difficulty to relocate and get expert services because of the less interest based on weaknesses in the support systems -Visa processing times -job opportunities to the family members -schools availability to kids -availability of English-speaking family doctors
Time criticality and relocation delays	
Characteristics	
Best industry experts do not hunt jobs	

Name	Description
Candidates expect company values	Company values and Social responsibility
Continuous learning for the survival	
Focused more on materialistic benefits	
High demand for IT experts	
High demand towards short term intense courses	
Job is no longer the first thing in the life	
Less importance on the appearance and impression	
Less important to certifications but high importance to knowledge	
New generations show achievements, projects and initiatives in addition to certifications	
Other benefits are being more valued than money	Opportunity to learn and develop, culture, team structure, technologies are being more popular and critical factors than the salary
Tech savviness increase weakness in communication	New generations are more tech savvy and that has influenced to weaken the ability of summarising own thoughts
Time limitations and lifestyles prevent people from learning.	

Acknowledgement

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