

SHORTAGES, SKILLS AND OLDER WORKERS IN INFORMATION TECHNOLOGY LABOUR MARKET OF LATVIA

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Abstract. This article examines the labour market situation in the sector of information technology in Latvia, paying attention to the insufficiency of labour force due to the skills gap and employability of older workers. The article is based on application of multidisciplinary research methods including employment and skills analysis theories, policy analysis approach and qualitative in-depth open-ended stakeholders interview method. To begin with, it analyses labour market skills gap versus potential of professional mobility and offers an overview of skill classification. Secondly, it focuses on the economic indicators of the information technology industry sector in Latvia and offers reflections on the causality of the main problems in information technology labour market. It assesses the macroeconomic indicators of the information technology sector in Latvia and concludes that the most significant obstacle for successful development is the lack of human resources. The findings of this article indicate that labour market policies focusing on employability of older people in information technology jobs need to be extended in order to overcome the shortage of labour force and face the challenges of the continuous decrease of the proportion of the working-age population compared to the retirement age population.

Keywords: *labour market, skills, professional mobility, older workers, information technology sector.*

JEL code: J24; J62

Introduction

The development of the global economy in the digital age is based on the increasing use of information technology. “New economy” and especially modern Knowledge based economy are creating crucial changes in the approaches and functioning of traditional sectors of economy accompanied by the development of research based solutions and use of innovative tools. At the same time the new sectors appear and rise quickly. Global research on the role of information technology in business shows that digital strategies in the public and private sectors cannot exist without support of information technology. The main trends indicate that information technology play more than a basic role in digitization processes – information technology are critical for innovations and business drive, meaning – the development of entrepreneurship and macroeconomic growth are both promoting competitiveness on a global scale of national companies and national economy in totality.

Analysts of global processes agree that new technologies do not in themselves improve competitiveness – the determining factor is the ability to integrate new technologies into existing or redesigned business processes. It means that the ability to deal with new technologies is closely related to human resources. The aim of this article is to analyse the situation in labour market in the sector of information technology in Latvia, paying attention to insufficiency of labour force due to the skill gap.

One of the largest global surveys, conducted by Harvey Nash / KPMG for 20 years (Harvey Nash / KPMG, 2018, 2020) is gathering the views of information technology executives worldwide on information technology strategy, priorities and human resources. 2018 report indicates that of the nearly 4,000 information technology executives surveyed who represent different geographical regions and industrial sectors, 65% acknowledge that the development of their companies is hampered by a lack of human resources. In 2019, this number increased to 67%. In 2020 survey data pre-Covid it was 66%, with a slight decrease in survey implemented post-Covid where this indicator was at 54%. The decrease of the indicator could be explained by the increased use of remote working which allows companies to widen their talent pool worldwide, and also by the growing place of automation.

Employment strategies in information technology industry have traditionally relied on young entrants and consequently this sector is directly impacted by the pressures of changing demography and labour shortages. Since the late 90ties the impact of ageing population on employment and the labour market has been one of the most pressing issues confronting European societies (Walker, 1999, Taylor et al., 2013, Konrad et al., 2020).

Given the present situation of increasing labour force shortages in the information technology industry and the need to intensively look for short term and long term solutions to address this problem at both macro and micro levels, the research question of the present article was defined as follows – how to measure to what extent the retraining of older workers can solve the problem of labour shortages in the information technology sector in Latvia?

The combination of multidisciplinary research methods were applied during the research, including policy analysis approach, application of macroeconomics employment and skills analysis theories. The analysis of the current situation focused on the overview of the economic performance indicators of the information technology sector, taking into account both macroeconomic aspects and the availability of resources and competencies of the sector, including aspects related to human resources and labour market skills gap.

The qualitative analysis was based on the in-depth open-ended stakeholder interview method. Stakeholders represented government institutions, non-governmental organizations (NGOs), private sector and academia. Interview data analysis was conducted using NVivo qualitative data analysis software.

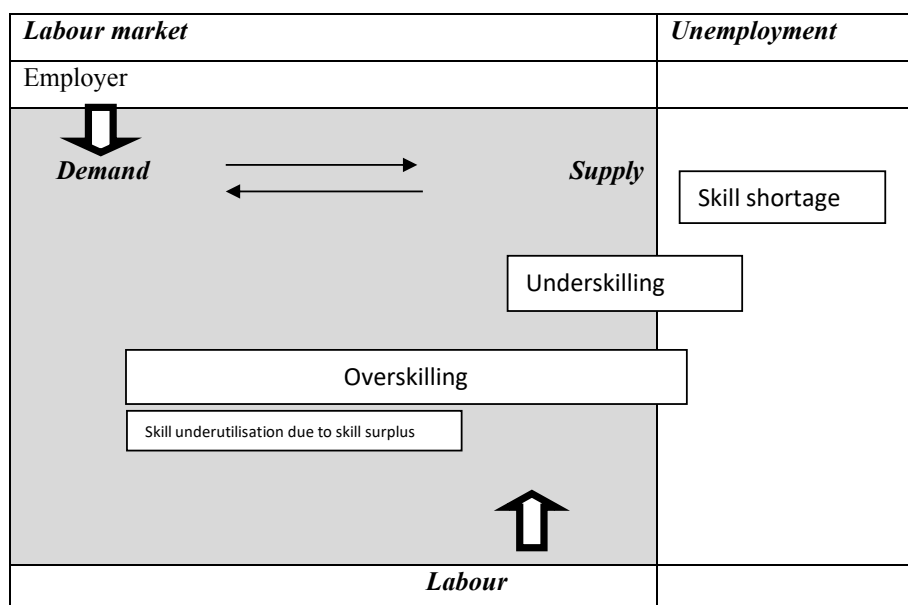
1. Labour market skills gap versus potential of professional mobility

During the era of high technologies and knowledge based economy in general, the skills and the qualification have an important impact on the employment at the level of individual, on the level of enterprise and on the level of national economy. To describe the characteristics of labour, the term “skills” can be used to accentuate the potential to change and to develop acquired skills. PES concept (Green, 2011) is proposing to classify the skills as 1) productive, 2) expandable, 3) social. This concept is allowing to see the skills which are required by enterprises and which can ensure the accomplishment of direct job duties, completed by the skills which can be acquired in formal and informal (in official structures) and unofficial structures during the life. Such authors as J.Pinkston (Pinkston, 2009) or S.Garmise (Garmise, 2006) are writing about professional skills required by labour market. But due to the technological changes, highly qualified and low qualified labour can be replaced by artificial intelligence in automatization processes or replaced by cheaper labour force in lower income level countries in production relocalization processes. F.Levy (Levy, 2010) is mentioning 2 types of skills – complex communication and expert thinking which cannot be replaced by the computers.

At the same time it is necessary to take in consideration that the skills are formed during the life and age has a significant impact on the ability to utilize the skills. Such authors as F.Cuhna, J.Heckman, L.Lochner and D.Masterov are providing the idea that the skills acquired during one period of life are increasing the adaptation of other skills during later stages of life (Cuhna, Heckman, Lochner, Masterov, 2006). The health indicators, physical resistance, flexibility, sensor skills are diminishing with age but the role of cognitive skills is rising (Turek, Perek-Bialas, 2013). It is important to notice that in knowledge based economy, the role of physical skills for labour is less important.

Labour with certain skills is not automatically connected to the job vacancies offered by employers. In between the demand and the supply of labour, the mismatch can appear due to differences between the qualification or skills of labour and the qualification or skills required for the job. Such a mismatch can appear in cases when the education level of the person is not convenient for the chosen profession or because of insufficient information about the labour market (Global Agenda Council on Employment, 2014). Certain skill gaps can appear due to 1) skills shortage, 2) underskilling, 3) overskilling of the person or 4) skill underutilisation because of a skill surplus which is not utilized by the employer.

The authors of this article are proposing the following illustration of skills gap:



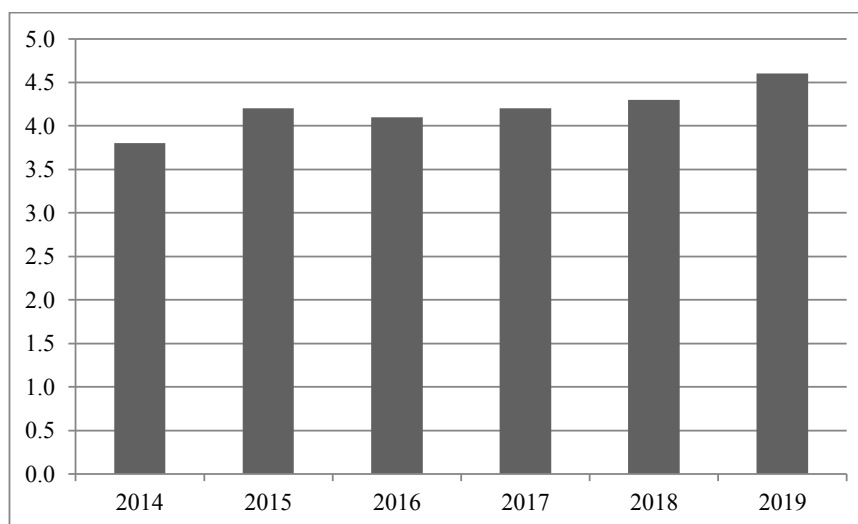
Source: authors' construction based on OECD materials

Fig. 1. Skills gap in labour market

Education/qualification mismatch is one of the most studied forms of mismatch of skills to the demand of labour in the market, for example in the studies of R.Desjardins and K.Rubenson (Desjardin, Rubenson, 2011). The correspondence of education or qualification can be the following: 1) required education/qualification, 2) undereducation/under-qualification, 3) overeducation/over-qualification. For certain job positions it is difficult to join the job with a very precise education, but due to fast technological changes, professional mobility is necessary. The portability of skills from one job or profession to another is ensuring the employability of the person. Similar position is developed in Lisbon Strategy of EU about life-long learning and supported by ILO in International Labour conference in 2008. The authors of this article would like to insist that the position to invest in own education or qualification during different periods of professional life to stay economically active and to be adjusted to the requirements of labour market is fully corresponding to the classical conception of human capital developed by G.Becker in 1960's: the treatment of actual investments in education or qualification are raising the future skills as a return of investment converted in the employability and the income level.

2. Economic activity indicators of the information technology sector in Latvia

The key macroeconomic indicators of the information technology sector include the share in the economy, export, value added, and productivity. The information technology sector's share of value added in GDP spiked from 3.8% in 2014 to 4.2% in 2015 and since then is experiencing a steady growth with very similar share numbers 2016 – 4.1%, 2017 – 4.2%, 2018 – 4.3%, 2019 – 4.6% (See Fig. 2).



Source: authors' creation based on databases of the Central Statistical Bureau of Latvia

Fig. 2. Information technology sector share of value added in GDP in Latvia (2014 – 2019)
(current prices, % of total gross value added)

Micro level business indicators of the information technology sector such as number of enterprises, number of employees in the sector, pre-tax profit of enterprises, turnover, and personnel costs also show a steady growth since 2014. See Table 1.

Table 1

Key business indicators of information technology sector in Latvia (2014 – 2019)

	2014	2015	2016	2017	2018	2019
Number of enterprises	5432	6133	6567	6559	6900	6996
Number of employees	26522	29203	31801	33990	37300	37225
Profit before tax (EUR million)	221	247	290	275	395	427
Turnover (EUR million)	3063	3497	3471	3617	3851	4097
Personnel costs (EUR million)	410	472	541	613	732	827
Value added (EUR million)	791	903	1018	1122	1263	1400

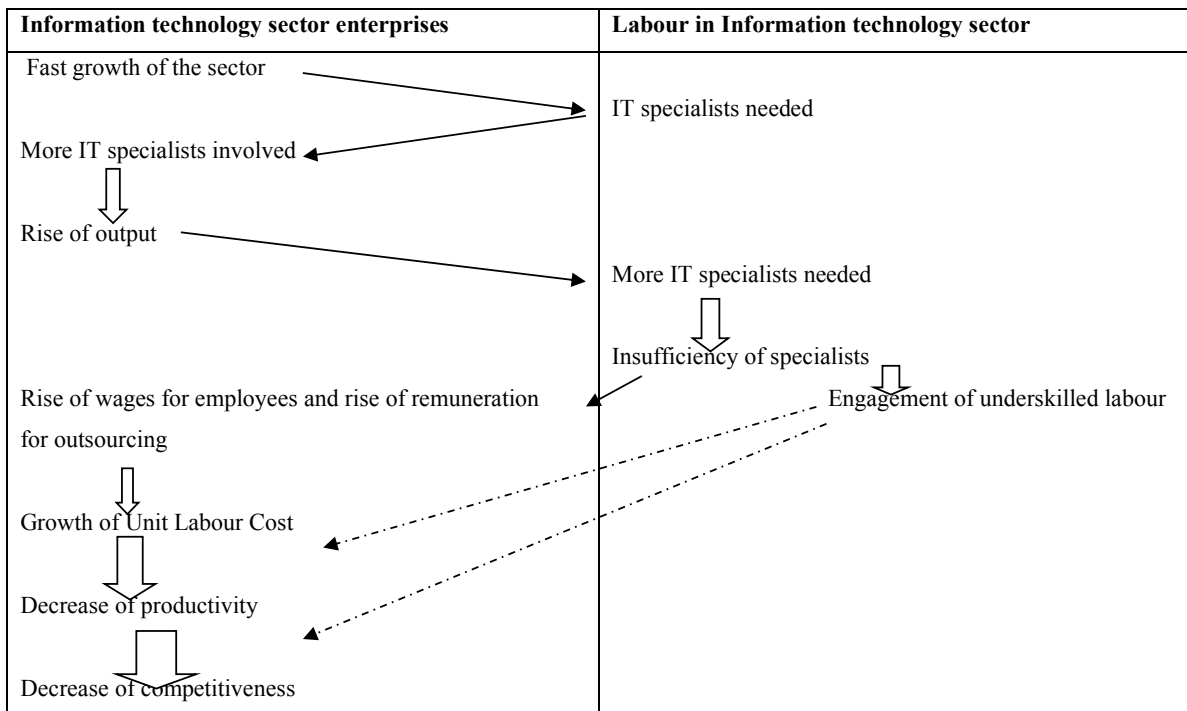
Source: authors' creation based on databases of the Central Statistical Bureau of Latvia

The changes in value added and number of jobs show that in the period after the economic crisis, the information technology industry's production volumes are steadily increasing. In 2015, production volumes in the sector increased by 6% compared to 2014. In turn, compared to the lowest point of the crisis in 2010, in 2015 the output of the sector had grown by 62% and exceeded the pre-crisis level by 25%.

Compared to the increase in production, the number of jobs in the sector is growing much faster, which indicates a decrease in productivity. In 2015 the data of Ministry of Economics of Latvia is showing, the number of occupied jobs increased by 11%. In 2015, compared to the lowest point of the crisis in 2010, the number of jobs had increased by 139%.

One of the most important indicators of the negative impact of the lack of information technology specialists on the development of the information technology sector is the unit labour costs (ULC). Since 2010, the ULC in the information technology sector in Latvia has grown by 72%. (Ministry of Economics of Latvia, 2108) The increase in ULC can be largely explained by the high demand for information technology specialists in the labour market, as shown by the current situation and labour market analysis, therefore maintaining cost competitiveness is not possible at the expense of reducing labour costs. This trend will continue, and without productivity gains, the risk of reduced cost competitiveness increases significantly (Ministry of Economics of Latvia, 2018).

The authors of this article would like to propose the following scheme reflecting the causality of the main problems in information technology labour market:



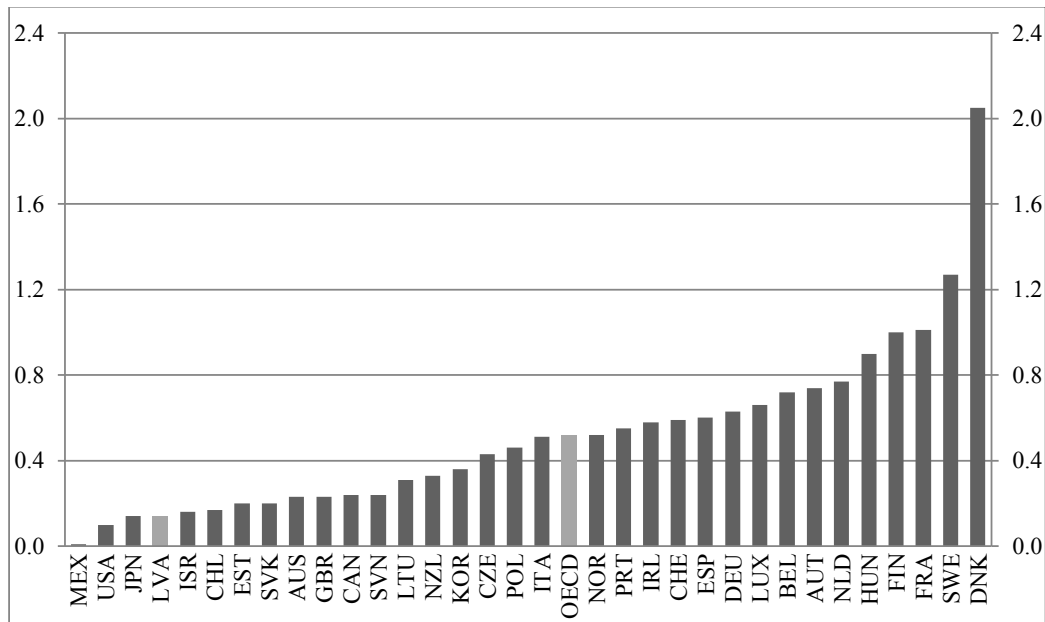
Source: authors' creation

Fig. 3. Negative impact of the information technology labour force shortages

The main and determining resource in the field of information technology is a highly qualified labour force. Ensuring the creation of conditions that would allow to gradually reach the number of information technology specialists required for successful operation and development of information technology sector could increase information technology sector productivity and reduce ULC growth.

3. Macro and micro level solutions for labour force shortages in information technology sector

As noted by OECD experts in Economic Survey about Latvia: “Substantial progress has been made to increase the effectiveness of active labour market policies (ALMPs) such as by profiling job seekers to determine programs according to their characteristics and by evaluation. Training programmes are designed by a committee involving social partners to respond to skill demands in the labour market[...] Plans to improve access of the unemployment to the reformed modularised vocational education system are welcome.” (OECD, 2017). As we can see from the figure below, (in comparison to ~ 0.5% among OECD countries on average).



Source: OECD (2017), *OECD Employment and Labour Market Statistics (database)*

Fig. 4. Comparative data on expenditure on active labour market policies

In 2019 OECD published an in-depth analysis about ALMPs in Latvia – “Connecting People with Jobs, Evaluating Latvia’s Active Labour Market Policies” (OECD, 2019), concluding that more extensive use of ALMPs has become one of the primary objectives of Latvia’s Inclusive Employment Strategy 2015-2020, especially with regards to disadvantaged groups, including older workers.

Macro level. First of the ALMPs measures for older people is a programme that was introduced in 2017 and seeks to prevent older employees losing their jobs. This programme promotes active ageing related strategies in firms and offers career counselling, basic competency measures, workplace adjustment and measures for occupational health to employees aged 50 and above who are at risk of unemployment (corresponding to this article’s authors’ area of interests). The risks of employment are identified as follows: 1) part-time or low wage work, 2) health issues that reduce work capacity, 3) secondary level of education, or 4) constraints resulting from family care obligations. The programme is intended to involve 3 000 participants by 2023.

One of the projects of this programme titled “Support for longer working lives” was implemented from 2017 to 2020 by the Latvian State Employment Agency (State Employment Agency of Latvia, 2020) in cooperation with the Latvian Employers Confederation and the Free Trade Union Confederation of Latvia. The total eligible funding available for the project was 1 896 211 euro including 1 611 779 euro from the European Social Fund and 284 432 euro from the state budget. As a result of the project, 500 older employees received support. This result should be considered to be very important for a country with less than 2 million inhabitants.

In addition, other ALMPs measures support life-long learning and target employed persons with a low skill level and older workers. One of the programmes provides vocational training including formal qualifications as well as career counselling and the certification of professional competencies. The selected participants only have to bear 10% of the training costs. In 2017, close to 13 000 persons were supported under this programme. According to OECD experts (OECD, 2019) training for the unemployed has had positive effects on labour market outcomes, although the voucher system used to allocate training may be improved – some disadvantaged groups may need additional support when using their vouchers, training providers are not distributed evenly across municipalities which sharpens the need for supporting regional mobility, and the voucher system currently in place in Latvia may compound so-called lock-in effects. In order to evaluate these results, the authors of this article would like to make a comparison: small positive effect on the probability to remain employed was identified for subsidized training programmes in Germany by C. Dauth and O. Toomet (Dauth, Toomet, 2016). Their analysis found that these programmes improve the probability to remain in paid employment by approximately 2.5 percentage points in the 2 years following treatment. Effects were more pronounced for part-time workers, long-duration programme participants, and for workers older than 55 years. These findings suggest that subsidized training may be considered as means of increasing the labour market attachment to part-time workers and to older workers in general.

In addition to AMPLs, there are other retraining initiatives in Latvia such as the project “Next Generation Micro Cities of Europe” of the European Union initiative “Urban Innovative Actions” currently implemented by Ventspils High technology Park Foundation DarbaGuru together with “Ideju Kapitāls”. The aim of the project is to prepare and retrain specialists for jobs in information technology related professions and skills, attracting already qualified specialists to companies or helping to acquire the necessary knowledge in training and allowing to change professions. Funding attributed for this project is 1 62471.50 EUR (PMB, 2019).

The authors of this article believe that it would be beneficial to use the experience of retraining programmes under such initiatives as previously described project “Next Generation Micro Cities of Europe”, as well as measures implemented by information technology companies to train new employees, in order to review and, if necessary, adjust current training programs within AMPLs aimed at requalification to enter jobs in information technology sector.

Micro level. In 2018 one of the authors of this article implemented research financed by the Ministry of Economics of Latvia with the aim to analyse whether it is possible to overcome the information technology sector labour market shortages by creating a new information technology university in Latvia.

An important part of this research was conducting non-structured, open-ended, in-person stakeholder interviews. The initial number of interviews during methodology development period was 18, but in the course of the research 4 more interviews were added. In total, 23 stakeholders were interviewed. The detailed list of stakeholder groups, types and number of interviews for each group is presented in Table 2.

Table 2

Stakeholder groups, types and number of interviews

No.	Stakeholder group	Stakeholder type	Number of interviews
1.	Government	State institutions representatives	3
2.	NGOs	Experts of non-governmental institutions	3
3.	Private sector	Representatives of largest Latvian IT companies	3
		Representatives of leading companies in the IT sector	4
		Representatives of small and medium enterprises in the IT sector	3
		Representatives of IT companies with foreign capital	3
4.	Academia	Experts from academic institutions	4
Total			23

Source: authors' creation

Based on the analysis of available information and the opinions expressed by the public administration experts, entrepreneurs and higher education representatives during the interviews, the following evaluation criteria were defined: 1) ability to provide 3000 (indicative calculation) graduates of information technology study programs per year; 2) minimum amount of investment to implement the solution; 3) fast time schedule for model implementation and development – start of studies in 2020; 4) ability to attract foreign students; 5) ability to ensure the involvement of information technology companies in the implementation of the chosen model; 6) the ability of Latvian higher education institutions plays an active role in the implementation of the proposed solutions; 7) education of information technology specialists who start or continue their professional career in Latvia after graduation and who are able and motivated to create their own companies, create new products and new jobs, thus promoting the overall development of the information technology sector and productivity indicators in other sectors.

The set of measures identified during the research show that in the course of further problem solving in the higher education system it is necessary to develop in-depth and detailed proposals related with the necessity to ensure the acquirement of knowledge and skills in information technology in the following main directions:

- 1) Interdisciplinary orientation and content of higher education information technology programs;
- 2) Evaluation of the information technology' component in other higher education sector programs and the addition of tailor-made courses where only core courses are currently offered;

- 3) Involvement of information technology companies in the development of university programme content;
- 4) Opportunities to use company employees to increase the capacity of teaching staff (support from company management for those employees who devote time to give lectures at universities);
- 5) Involvement of the State Employment Agency in ensuring the link between higher education and the national economy – use of information and expertise of the State Employment Agency, evaluating the possibility to expand the agency's powers to engage in consulting on curriculum content development.

In addition to the previously described research results, the collection and continuous analysis of the available data has led to the conclusion that the shortage of information technology professionals cannot be solved solely by the measures related to the higher education and that the creation of joint information technology programmes will not present sufficient results. The authors of this article would like to insist that several factors influencing the labour market shortages in the information technology sector are closely linked to a number of other areas, such as: 1) digital skills; 2) remuneration of information technology specialists compared to other EU countries; 2) demographic situation; 3) education policy from primary school to secondary school level (mathematics, programming, digital skills); 4) employment policy proposing different retraining programs; 4) migration processes and outflow of IT specialists from the country; 5) immigration policy which can attract IT specialists from other countries. With respect to migration policy measures, data analysis and information obtained during interviews indicate – first, that it is necessary to improve the opportunities for foreign students to find jobs after graduation, second, that attracting foreign specialists to train local staff, even temporarily, remains very difficult.

Authors of this article consider that retraining activities using the experience of the State Employment Agency and private companies involved in adult education and requalification need to be evaluated in order to avoid problems similar to the one identified during interviews with small and medium-sized information technology enterprises. The problem mentioned was related to the training project “Improvement of Professional Competence of Employed Persons” organized by State Education Development Agency of Latvia: it was pointed out that the project includes a restriction that one person can participate in the programme only once. According to the entrepreneurs whose employees use these courses, it is necessary to review this restrictive condition. Given that the project implementation timeline is 1 January 2017 – 31 December 2022, the parties involved in the project have concluded that such a restriction is disproportionate. Information technology field is one of the 11 sectors in which training is offered. By providing such a restriction, one person is allowed to participate only in one training course during a period of five years. In the view of interviewed stakeholders, the goal of promoting further education could hardly be achieved. The suggestion from companies participating in the programme would be that 1) at least 3 courses for 1 person should be supported, particularly in information technology sector, where new skills need to be acquired at least every 3 years. 2) Another alternative could be to change this requirement as an evaluable criterion, if a person has already completed 2 courses, then applying for the 3rd course has an advantage for those who have not yet used this opportunity. In turn, if there are no such applicants, the applicant can also attend the 3rd year course.

After analysing the results of in-depths interviews with information technology experts and higher education experts, the authors of this article identified proposals related to all levels of education system, as well as adult education and retraining activities that need further examination.

Demographic indicators of the dependency ratio indicate changes in the age composition of the population in Latvia – the proportion of the working-age population (15 – 62 years) compared to the retirement age population continues to decrease. Since 2011, the number of working-age population has decreased by 155 thousand and the population of retirement age – by 10 thousand. Since 1993, the proportion of the population of retirement age has been higher than the proportion of children and adolescents, which means that in future, the working age population will be smaller and the dependency ratio will increase. At the beginning of 2019 in Latvia, there were 373 people of retirement age and 259 children under 14 years of age per 1,000 working age population (Central Statistical Bureau of Latvia, 2019).

Adult education and retraining measures, drawing on the experience of the State Employment Agency and the experience of private companies involved in adult education, are showing the following: the experience of measures implemented by information technology companies for several years to train new employees could be used to develop and implement mechanisms in the form of pilot projects that would provide retraining opportunities for interested specialists in other fields and also have the ability to reorient to work in the information technology sector.

In the case of Latvia and given the ongoing reform of school network system, part of teachers will lose their jobs. Teaching professions have portability of skills indicators for the information technology sectors and tailor made retraining programmes would

ensure continuous employability of specialists, majority of which are people over 40. Therefore it is advised to analyse the possibility of offering retraining programs for teachers supported by the state and the information technology industry.

The impact of the information technology sector on the economy as a whole is vital to meet the challenges of globalization and to foster innovation, creativity and competitiveness throughout the economy; the use of information technology improve the work of the public sector and the public administration system; information technology also help to address social policy challenges by improving the quality of life and contributing to the aging population.

With respect to employability of older people in the information technology sector, the authors of this article consider that continuous multidisciplinary studies exploring the mechanisms that reduce employability of older people in Latvia are necessary. One of suggestions would be to conduct a similar study to the one implemented by K.Turek and K.Henkens (Turek, Henkens, 2020) in Poland, assessing how recruitment of people over 50 years old is influenced by the job skill requirements – their study used a real-life framework by referring to existing vacancies and actual requirements that reflect labour demands at the scale of an entire national labour market. The results of the study are pertinent to the information technology labour market because the engagement of older candidates in this sector are pushed aside due to required computer, physical, social, creative and training skills.

In the study on digitalization and structural labour market problems in Germany, U.Walwei (Walwei, 2016) emphasizes that with respect to increasing role of information technology, “labour market policy will have to play a more preventive role than in the past by facilitating lifelong employability. Such policies would consist of a more continuous professional counselling (e.g. regarding options of further and new qualifications)”. Due to this, a second suggestion can be derived in relation to the role of labour market in the sector – that the monitoring of the situation, the identification of possible gaps and a timely orientation of potential labour force groups is needed to change their qualification.

In such conditions, skill adjustment and development (including for older workers) will be the major topic. The authors of this article consider that in Latvia, skill adjustment and development should remain an integral part of active labour market policies, including measures geared towards retraining older workers for employability in information technology sector by the use of their experience to extend their skills. The portability of skills from one job or profession to another is ensuring the employability of the person, simultaneously ensuring stable development of the sector, stable flow of income both for the individual and for the enterprise, followed by economic growth and rise of competitiveness of national economy.

Conclusions, proposals, recommendations

- (1) The sustainability aspects of the solution to the shortage of information technology specialists are based on the overall economic development in the direction of digitalisation, which means that the demand for information technology professionals in Latvia, the European Union and the world as a whole will only continue to grow.
- (2) The analysis of the current situation on Latvia's macroeconomic indicators and the interviews of experts and stakeholders carried out during this study confirm that the most significant obstacle to the successful development and integration of digitization processes in existing production and service areas in Latvia is the lack of human resources in the information technology sector.
- (3) Overall, the research results present sufficient proof that methods aimed at increasing number of graduates in the information technology study programmes does not represent enough capacity to solve labour supply shortages in the information technology sector.
- (4) The policy measures aimed at solving the human resources shortages in the information technology sector adopted in Latvia so far have mainly focused on attracting younger people. This study shows that labour market policies focusing on employability of older people in information technology jobs needs to be extended.
- (5) The orientation of certain groups of older workers (such as school teachers) to develop their skills to be employed in the information technology sector is an achievable purpose in overcoming 1) the shortage of labour force in the sector and 2) the challenges of the continuous decrease of the proportion of the working-age population compared to the retirement age population.

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