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ANALYSIS OF POSSIBILITIES TO DEVELOP HYBRID-SIMULATION TRAINING IN THE

Järva County Vocational Training Centre,
**Järvamaa Kutsehariduskeskus, JKHK
(Estonia)**

2021



HYBVET



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Project partners



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Abstract

This country case study is part of the Study of the specificities, context and perspectives of VET in Lithuania, Latvia, Estonia, Spain and Portugal. At the same time, the readiness and potential of the JKHK to undertake the development of a specific VET new program or module or the adaptation of an existing program through hybrid simulation training will be analyzed.

This case study from JKHK will form the basis for an agreement between the “Development of hybrid training in VET” project (No. 2020-1-LT01-KA226-VET-094679) partners on the next phase of the project and for the assignment of specific responsibilities to each partner.

This case study will answer what is the most relevant profession in Estonia and which competencies in this profession will be most important in the future.

Accordingly, JKHK will also be able to identify key selection parameters and form a preliminary team of VET teachers who will be trained to use and manage the hybrid simulation training as well as to prepare hybrid simulation training materials.

1. Problem, object and purpose of the analysis

The problem of the research is whether the JKHK has the right conditions, resources, sufficient abilities, measured need and high motivation to apply the hybrid-simulation training method in its activities.

The object of the research is the portfolio of vocational training programs implemented by the JKHK .

The aim of the research is to identify the most promising (most significant) economic activities (sectors) of the Estonian economy, for which the required specialist training programs (or their parts) could be implemented in the future using the applied hybrid-simulation training method.

2. Assumptions of the analysis

In order to select the areas of vocational training (programs or parts thereof) that have the greatest potential to contribute to the training of specialists most needed in the future Estonian labor market, it is appropriate to review the structure of the national economy and the impact of certain economic sectors on

the national economy. The latter factor is extremely significant, so in Part 3 of this analysis we will evaluate several aspects:

1. the number of employees in a given sector of the national economy and the share of employees in the country as a whole (a detailed analysis of this aspect would show the scope of training of the specialists in greatest demand in the future, as well as the scope of the need to improve the qualification of existing specialists; accordingly, the analysis would reveal the need to develop a hybrid training content that will improve the efficiency of the vocational training process and significantly reduce the training time);

2. how much taxes are paid by companies in a certain sector and what part of the Estonian economic portfolio they make up (this would strengthen the arguments for choosing a particular sector, as it would show the relative scale of companies' activities and turnover of products / services produced or sold);

3. what is the labor productivity of persons working in enterprises of a certain sector of the Estonian economy (this would reveal the tendencies of enterprises to

modernize and the dynamics of implementation and development of innovations in them).

The results of the review of the listed aspects will provide a basis for distinguishing the Estonian economic sectors (Part 3.4 of this analysis), for which the training of the required specialists will be the most relevant in the future. Accordingly, it will help to decide which vocational training content hybridization or the development of completely new hybrid training content makes the most sense.

3. Analysis of the Estonian economic trends and prospects

3.1. Analysis of the number of persons employed in a certain sector of the national economy

In February 2014, the Government of the Republic of Estonia approved the concept of a labor market monitoring and forecasting and skills development coordination system (hereinafter OSKA) to better link labor market needs and training provision. OSKA's goal is to reflect the changes taking place in the labor market and the needs of society as soon as

possible in order to adjust the training offers. OSKA combines the expertise of different social partners into a system that supports the planning of the structure, volume and content of education and training services, and supports cooperation between employers and educational institutions in developing curricula and accessing up-to-date labor market information to career services. Hence, this case study has been compiled mainly on the basis of OSKA reports and the database of Statistics Estonia.

Pre-Covid employment was significantly higher than at the peak of the previous economic boom in 2007. In addition, the unemployment rate and the number of unemployed in 2017 were already close to the pre-crisis period (Figure 1). Wages have risen in all sectors, but the wage gap between sectors has remained significant and is a major cause of labor shortages in low-wage sectors. For example, while in 2017 the average gross monthly salary in the field of information and communication amounted to more than 2,000 euros, in accommodation and catering it was less than 1,000 euros.

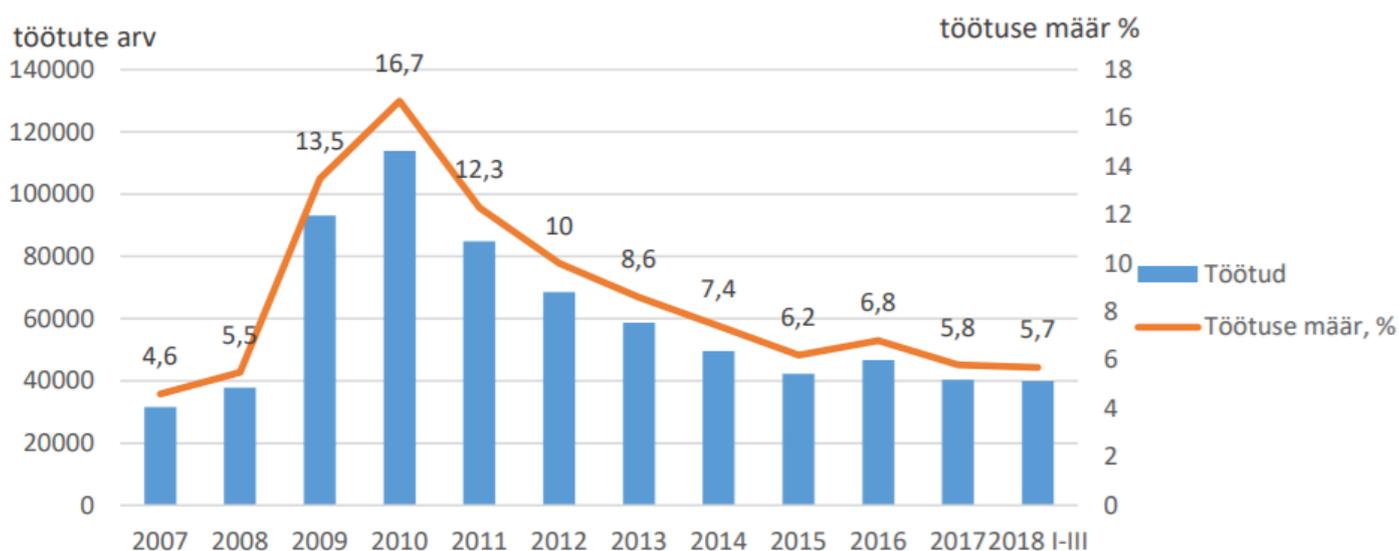


Figure 1. Number of unemployed people aged 15–74 and unemployment rate, 2006–2017. Source: Statistics Estonia, Estonian Labor Force Survey

The number of working age people in Estonia has continued to decrease, but the number of employed has nevertheless increased. The number of people of the classic working age,

i.e. those aged 20–64, was almost 25,000 less in 2017 than 10 years earlier, while the total number of employed persons increased by 1,000 in the same period. Total number of

persons employed increased (Figure 2) by three main sources: declining unemployment, increasing the share of the population active in the labor market (including older people,

people with reduced working capacity and parents of young children) and immigration. In Estonia, all three factors have contributed to employment growth. (OSKA 3)

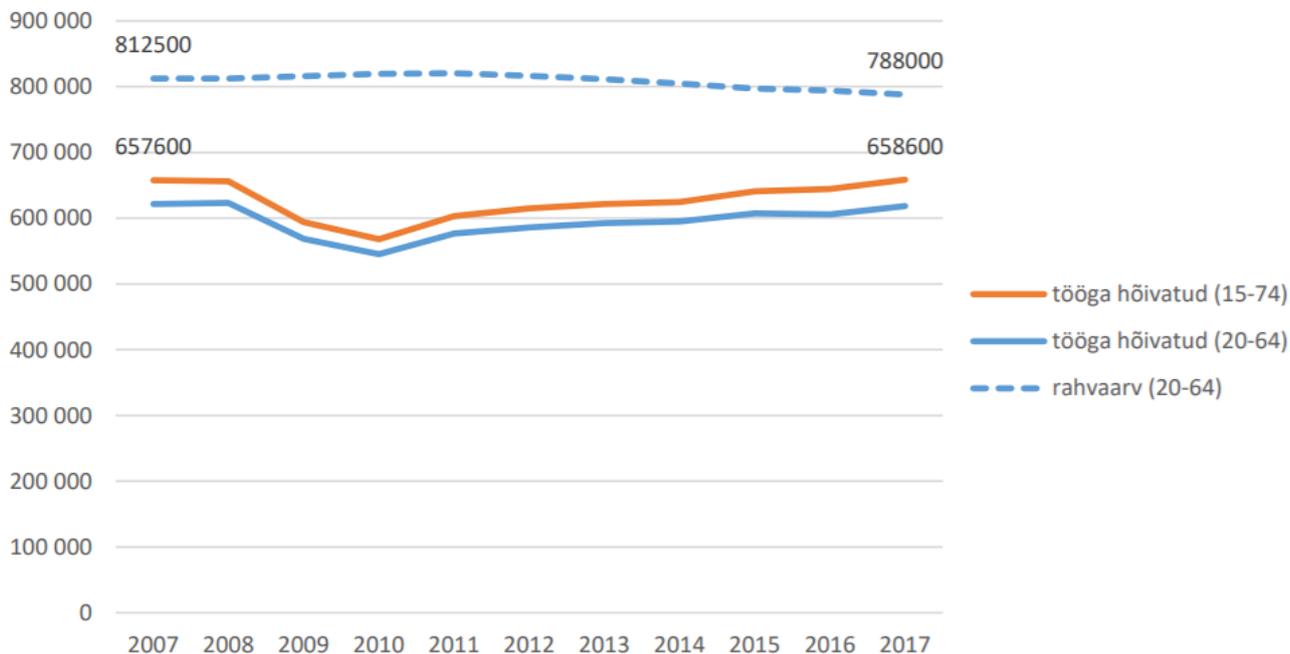


Figure 2. Number of employed and working age population 2007–2017. Source: Statistics Estonia

In 2026, there will probably be almost as many (655,000) employed as in 2017 (659,000). Thus, it is possible to maintain the stability of the number of employed over the next ten years. However, this does not mean that the structure of work and education or the need for labor will remain the same (OSKA 3), especially since the covid-crises have had a significant impact on employment and organizing the work.

The largest activities of the Estonian economy in terms of the number of employed are industry (including manufacturing, mining, water supply and energy), which in 2017 accounted for about 21% of the employed, wholesale and retail trade (13%), construction (9%), education (9%) and transportation and warehousing (Veendus ja laondus; Figure 3). (OSKA 3)

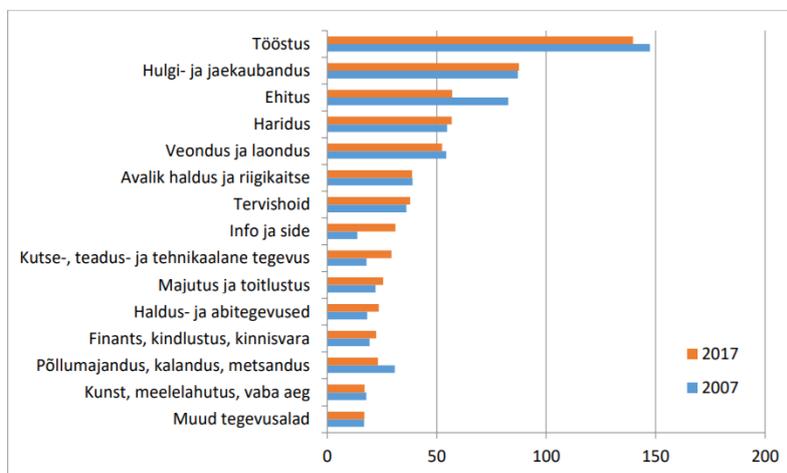


Figure 3. Number of employed by economic activity (thousands), 2007 vs. 2017. Source: Statistics Estonia, Estonian Labor Force Survey

In most industries, the change in employment is forecast to be within + -10% by 2026 (compared to the average employment in 2015–17, Figure 4). The forecast is also based

on the assumption that the structure of occupations in the economy will change relatively slowly. (OSKA 3)

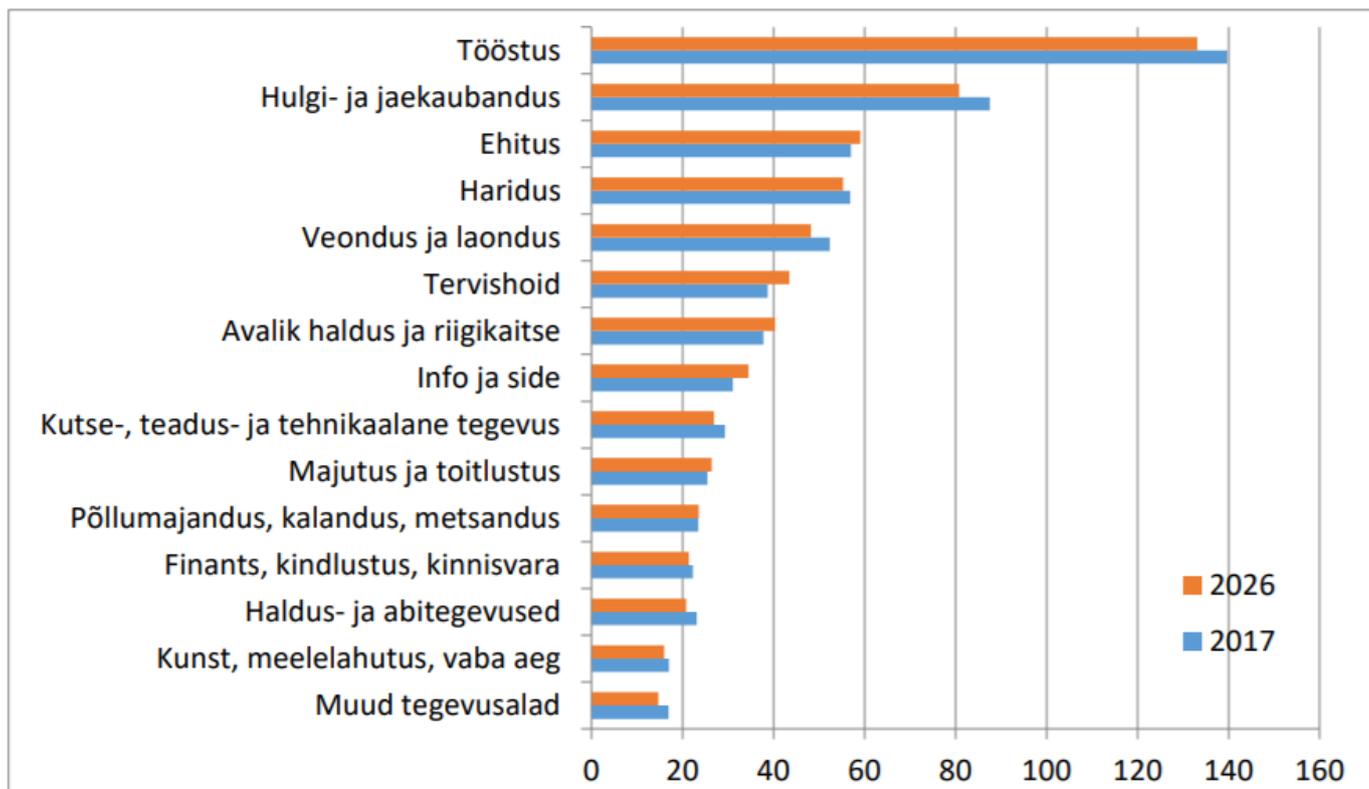


Figure 4. Change in the projected number of employed by economic activity (in thousands), 2017, 2026. Source: Statistics Estonia, Estonian Labor Force Survey; Ministry of Economic Affairs and Communications (MEAC), Labor demand and supply forecast;

OSKA covers several areas, but this analysis focuses on the areas of specialties taught at JKHK, where the demand for training the workforce that meets the needs of the labor market is the highest.

According to an OSKA applied study, the growing demand for **accommodation, catering and tourism (MTT) services** will be modest over the next 5-10 years (2%), mainly due to the increase in the number of service employees. Demand is on the rise among the following specialties taught at JKHK: chef, room attendant, catering customer service. At the same time, the supply of training already exceeds the need for a new workforce. The biggest problem in this sector is finding workers and above-average labor turnover, which also refers to the specifics of the sector, such as irregular working hours, more frequent short-term contracts (including short-run jobs) and

part-time work, seasonality of work, low wages, high proportion of young people in employment. It is possible to work in many main professions without professional education, having appropriate attitudes, general skills and a willingness to serve and learn. The MTT field employs about 28,000 people. More than two thirds of employees in the field are employed in the catering business and about a quarter in accommodation.

The largest sub-sector of the accommodation and catering sector is catering, where more than two thirds of the employed work, the share of accommodation is almost one third. In recent years, the number of employed has risen to over 25 000 (Figure 5).

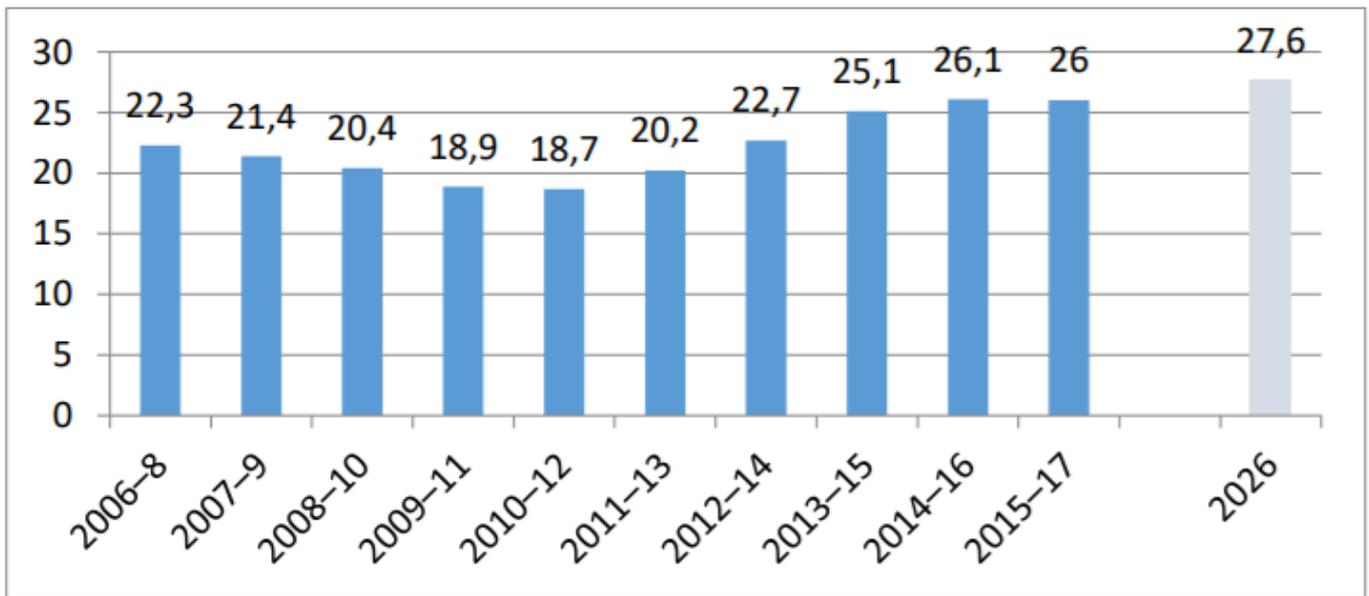


Figure 5. Number of employed in accommodation and catering (three-year average, in thousands). Source: Statistics Estonia, Estonian Labor Force Survey; Ministry of Economic Affairs and Communications (MEAC), Labor demand and supply forecast

The development of the accommodation and catering sector is closely related to the development of tourism. Tourism industry taking into account indirect effects, its share in Estonia's GDP and employment is about 7%. No significant changes in the structure of occupations in the sector are forecast. Most (almost 60%) are in accommodation and catering waiters - chefs, waiters, bartenders,

hotel administrators. In the case of chefs, vocational training (accommodation and catering) clearly dominates. Although there are enough graduates in the field of chefs, entrepreneurs still feel the labor shortages (chefs = peakokad, kokad; yellow - oversupply, red - undersupply, orange - market failure, green - sufficient, Figure 6).

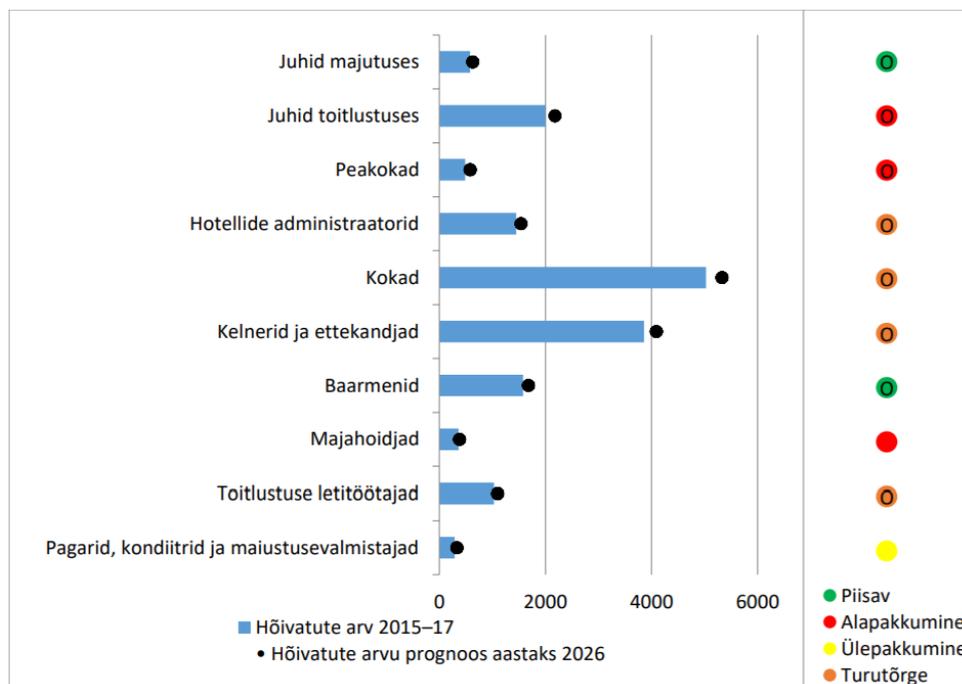


Figure 6. Major occupations in accommodation and catering 2015-2017 and employment forecast for 2026 and assessment of the supply and demand balance (O = OSKA). Source: Statistics Estonia, Estonian Labor Force Survey, Census of population 2011; Ministry of Economic Affairs and Communications (MEAC), Labor demand and supply forecast; OSKA

According to the OSKA survey of **agriculture**, including fisheries and the food industry (hereinafter PMTT), the number of employed has remained relatively stable in the last 5–10 years, but in the next 5–10 years, a moderate decrease in PMTT's main occupations is expected (Figure 7). 23,000 people were employed in this sector, or almost 4% of all employed in 2017. Major investments have been made in the sector to increase productivity, which has reduced the need for labor. The number of small farms and people employed on their own farms has also decreased. Agriculture directly employs about 17,000 people. The main sub-sectors are animal husbandry and mixed farming, where about three quarters of the employed work together. The decline in employment is related to productivity growth, and the production volume of both crop and livestock products has increased over the last ten years. According to

the OSKA survey, a decrease in employment is expected. Due to the age structure of the employed, the need for replacement of employees will be higher than average in the coming years. About half of the employees have vocational education, most of them have come from the agriculture and animal husbandry curriculum group. The share of adults in vocational education in the field of PMTT is higher than in vocational education on average, while the number of young learners is on a declining trend. The labor needs and training provision of most of PMTT's main occupations are balanced - in the main occupations of all specialists as well as several skilled workers (OSKA). In the future, there may be a shortage of young workers with vocational and higher education entering the labor market, but with all graduates, supply and demand would be in balance. (OSKA 3)

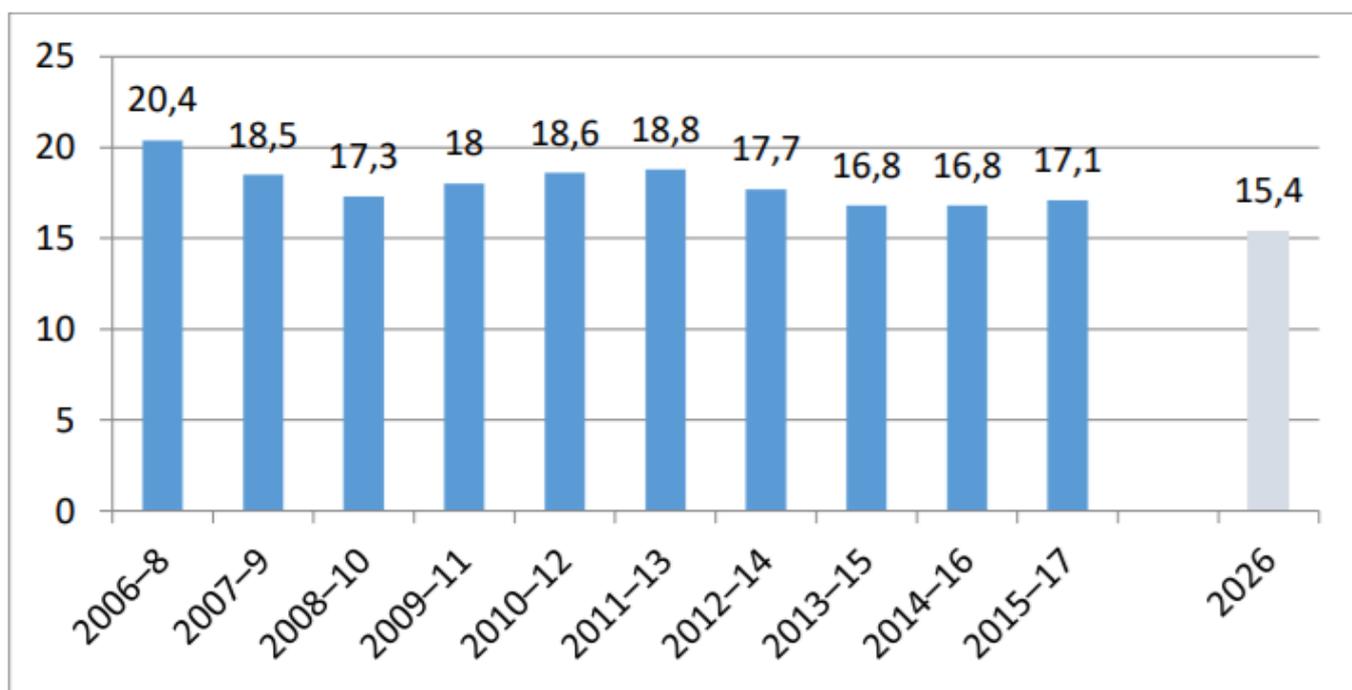


Figure 7. Number of employed in agriculture (three-year average, in thousands).
Source: Statistics Estonia, Estonian Labor Force Survey; MEAC, Labor demand and supply forecast; OSKA

The field of **construction** is one of the largest in Estonia in terms of both the number of companies and the number of employed. 2013-2015 on average, almost 63,000 people were

employed in the construction sector - one tenth of all people employed (OSKA). Every fifth person employed in construction works abroad, half of all employees abroad are employed in

construction (OSKA 3). In terms of the number of companies, this is one of the largest areas, where about 15% of all Estonian companies operate. Most of them are micro-enterprises with up to 9 employees in construction (91%). The general development of the sector and the change in the number of employed are influenced by the cyclical nature of the economy, investments of state and European Union support funds, as well as the persistently high demand for labor in the neighboring countries and several times higher wage levels. According to the forecast, the number of people employed in the construction sector will not

change in the next ten years. Concerns in the construction sector: there are not enough skilled workers due to the high number of dropouts (people moving to work during their studies) and the fact that skilled workers continue to leave for higher paid neighboring countries. In the next decade, the number of people employed in the main construction professions will remain the same (Figure 8), the need for training (e.g. stricter energy efficiency requirements, use of technology in construction) will change, as it is often not considered necessary to train new. (OSKA; OSKA 3)

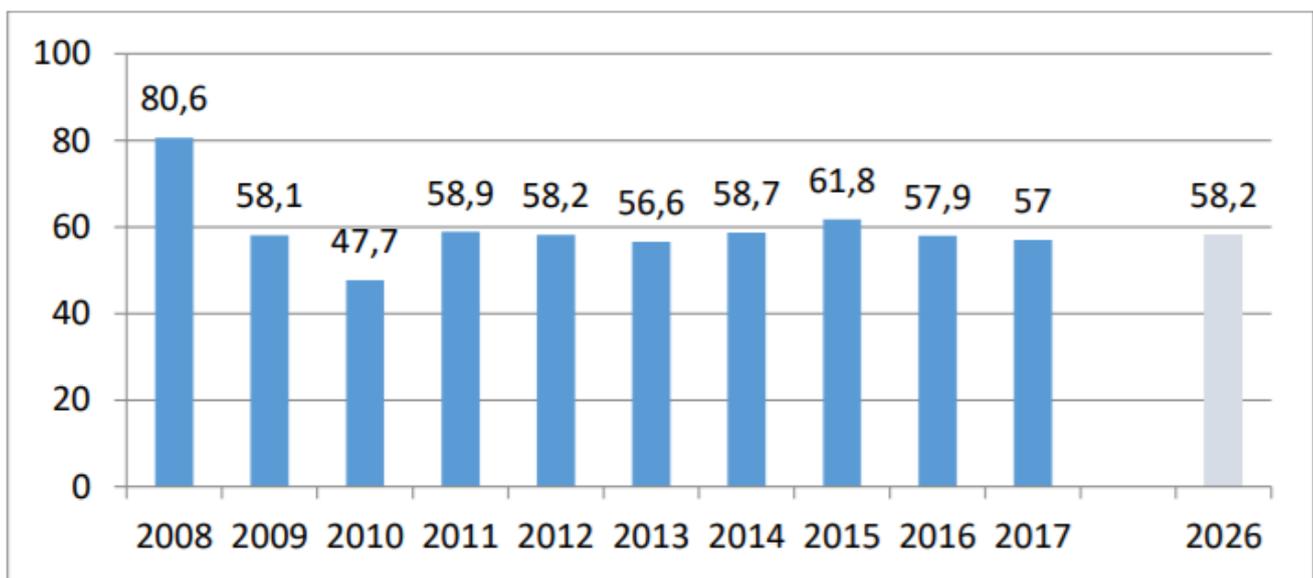


Figure 8. Number of people employed in construction (thousands).
Source: Statistics Estonia, Estonian Labor Force Survey; MEAC, Labor demand and supply forecast; OSKA

In the field of ICT, four sub-areas have been distinguished based on the nature of the work: electronics, software development, ICT systems and services, telecommunications and cross-sectoral management. In 2011–2013, companies in the ICT sector accounted for an average of 4.1% of all Estonian companies. Of the nearly 3,000 companies in the ICT sector, 94% were micro-enterprises with less than 10 employees. At the same time, 3% of all employees worked in the ICT sector. The average number of people employed in ICT professions in 2011-2013 was 22,970 (compared to the European average of 42% in the ICT sector in Europe). Despite the relatively small share of the employed, companies in the

ICT sector account for almost 6% of the sales turnover of the Estonian economy. This share has doubled compared to the 2005-2007 average. Compared to 2005, the number of employees in the ICT sector has increased by 32%. The increase in the number of employees in the ICT sector has taken place in the activities of ICT services, where employment has increased by 89% compared to 2013. The results of the OSKA information and communication technology survey have been taken into account when forecasting the need for programming manpower (Figure 9). Software development also includes computer systems and database management and computer consulting. Software development is

the fastest growing sub-sector in the information and communication sector and there is still a constant demand (Figure 10). In 2017, 17,000 people were employed in the

field. There are almost 3,000 companies operating in the industry, of which 95% are micro-enterprises with less than 10 employees, employing more than 40% of the employed.

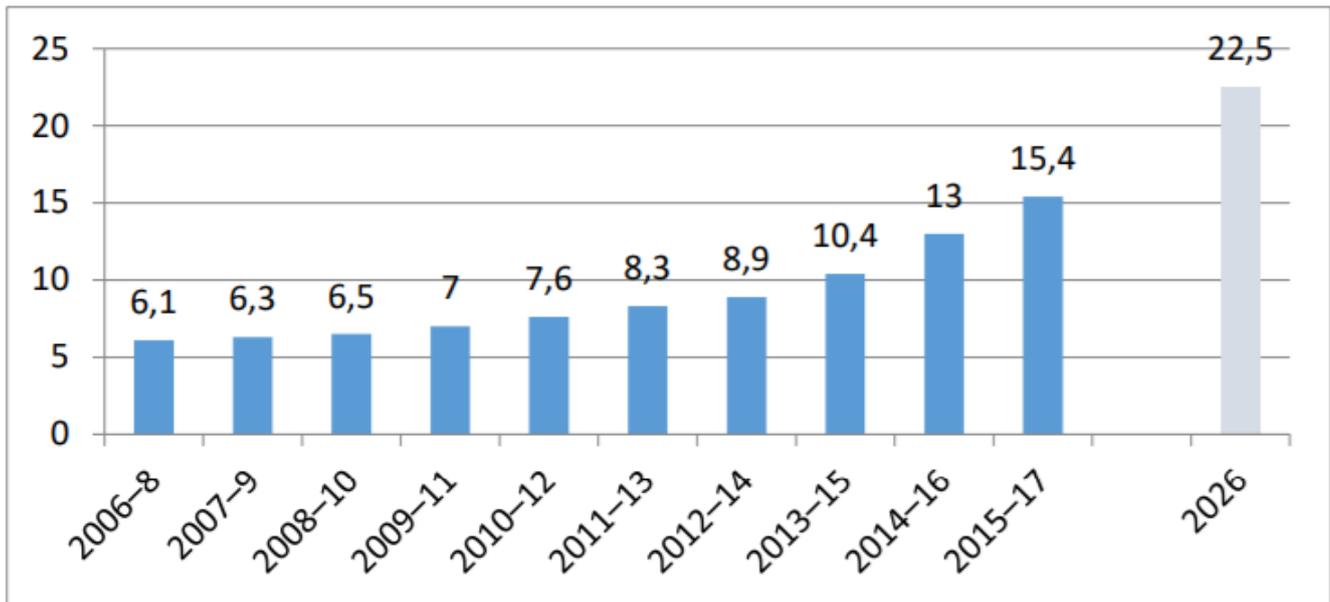


Figure 9. Number of people employed in programming, ICT (three-year average, in thousands). Source: Statistics Estonia, Estonian Labor Force Survey; Ministry of Economic Affairs and Communications (MEAC), Labor demand and supply forecast

In order to increase the number of ICT specialists, more people must be ready for level training or retraining. The wider adoption of ICT in other sectors of the economy creates an additional need for manpower: managers with ICT skills at higher education level and analysts / architects / developers of ICT solutions, managers of ICT solutions and systems at vocational level, etc. According to the expert panel, four educational institutions offer sufficiently high-quality ICT-related higher education. The total number of entrants is well above the projected need in the field of ICT, but the drop-out rate is high (higher than the Estonian average and also the average of European computer science students), i.e. almost every fourth student in ICT curricula (stable - last 5 years). Vocational education in

the field of ICT is offered in 18 schools, of which 11 vocational education institutions have received full accreditation, and the number of graduates has increased year by year. According to employers, it is a serious problem that graduates of both higher and vocational education curricula lack the practical skills necessary for employment. Demand for vocational graduates in the field of ICT is significantly lower and the forecast does not see any change in the employment of ICT specialists. Yet, here is a labor shortage in the field due to both the rapid growth of the sector and the assumption that workers have at least vocational or higher education, while the number of drop-outs remains high (although it has decreased in recent years).(OSKA 3)

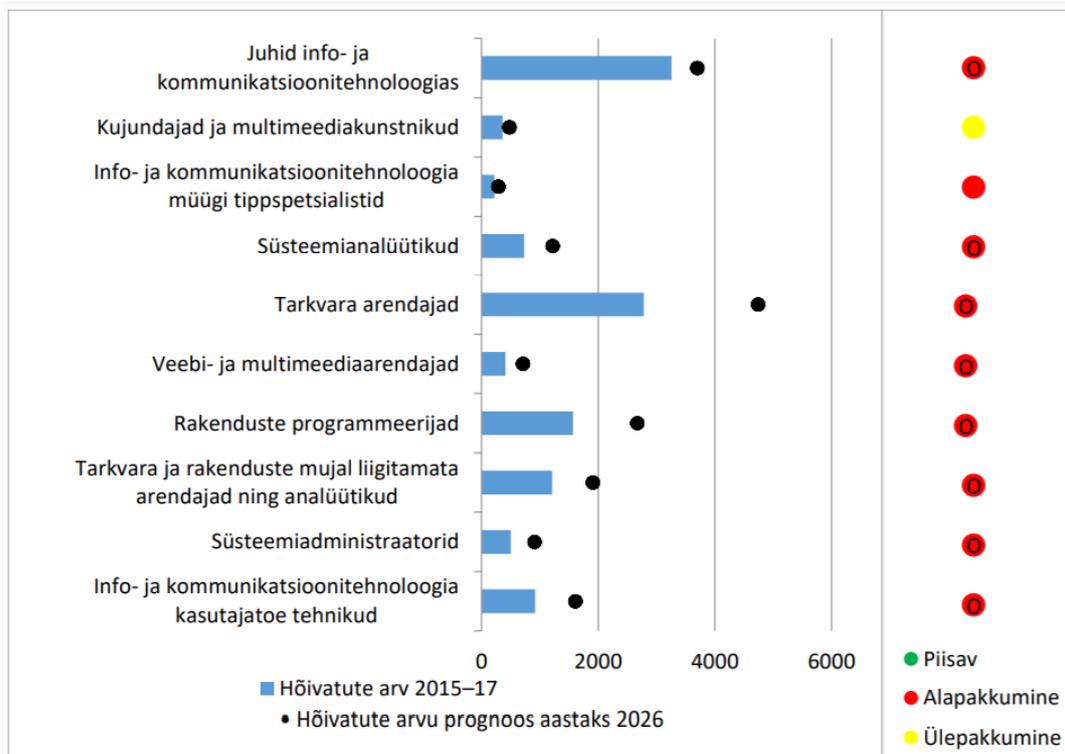


Figure 10. Major occupations in programming 2015–2017 and employment forecast 2026 and assessment of the supply and demand balance (O = OSKA).

Source: Statistics Estonia, Estonian Labor Force Survey, Census 2011; MEAC, Labor demand and supply forecast; OSKA

The results of the OSKA survey on **wholesale and retail trade** (trade, renting and repair, and transport, logistics, sale and repair of motor vehicles) have been taken into account when forecasting labor needs. The trade sector is the second largest field of activity in Estonia in terms of the number of employees. In 2017, almost 85,000 people or 13% of all employed people worked in trade (Figure 11). The

economic booms led to an increase in jobs in trade, but the employment is estimated to fall slightly in the near future. Yet, there is a shortage in a few occupations (e.g. suppliers, warehouse officials, wholesale and retail managers, yellow - oversupply, red - undersupply, orange - market failure, green - sufficient Figure 12). (OSKA 3)

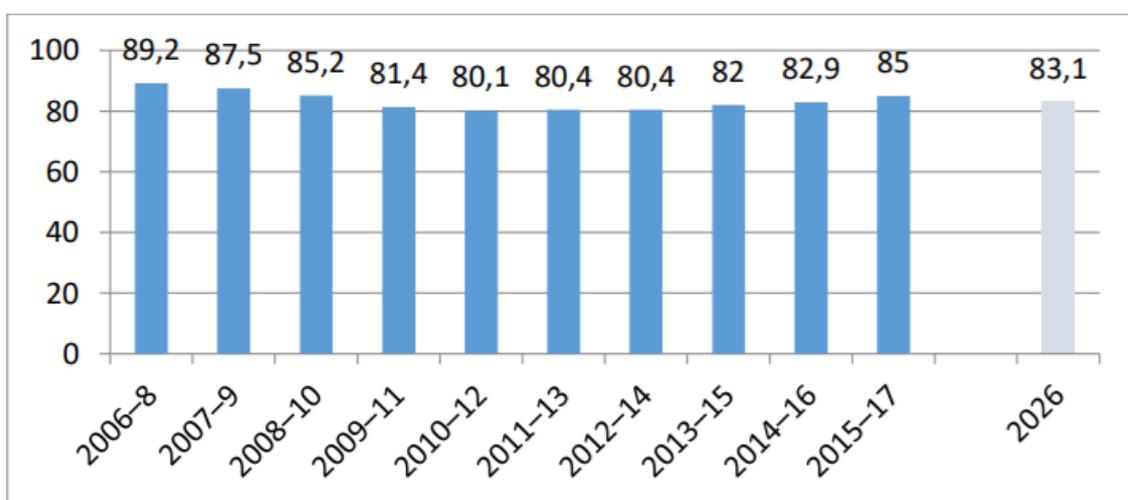


Figure 11. Number of persons employed in trade (three-year average, in thousands).

Source: Statistics Estonia, Estonian Labor Force Survey; MEAC, Labor demand and supply forecast

About 40% of employees have a vocational education, while the same number have a general secondary or lower education. Of the graduates of vocational higher education in recent years, more employees have come from

vocational education in the wholesale and retail trade and accommodation and catering curriculum groups, and in the field of management and administration (applied higher education).

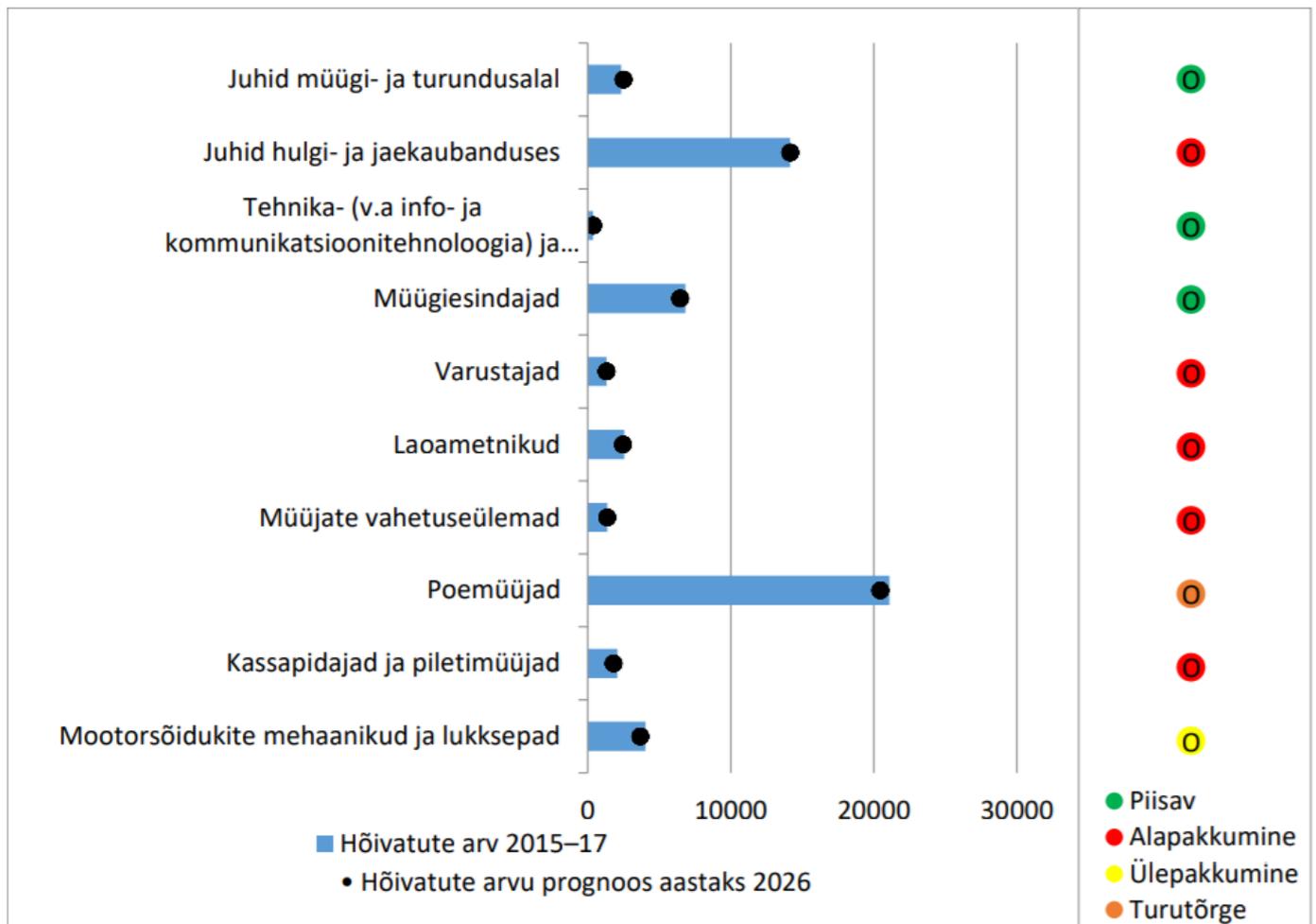


Figure 12. Major occupations in trade 2015–2017 and employment forecast 2026 and estimate balance between supply and demand (O = OSKA).

Source: Statistics Estonia, Estonian Labor Force Survey, Census of population 2011; MEAC, Labor demand and supply forecast;

The OSKA **Transport, logistics, motor vehicle repair and maintenance** (hereinafter TLM) sector, defined on the basis of the Estonian Classification of Economic Activities (EMTAK), is divided into three sub-sectors: transport (land transport, water transport and air transport), logistics (warehousing, transport support activities and post) and motor vehicles (repair and maintenance). More than 60,000 people are employed in transport, logistics and repair and maintenance of motor vehicles, which makes up 10% of all Estonian employees. (OSKA 2)

TLM is a large sector consisting of different branches and heterogeneous in terms of economic indicators (e.g. value added, productivity, average wages), characterized by rapid technological development and increasing international competition. It is difficult to predict the development trends and future labor needs of the TLM field, as many activities are on the threshold of major changes and there are many different influencing factors at the same time. Technological developments, new market entrants, innovative business models and changing consumer expectations create both additional opportunities and challenges. In addition, the geopolitical

situation, interstate relations, agreements and cooperation, EU policies and regulations, as well as state support and investments in projects important for transport and logistics. (OSKA 2)

The logistics sector accounts for over 7% of Estonia's GDP and employs almost one in ten people (Figure 13). The induced effects are even greater, as logistics and transport are important service providers for the whole economy, from industry to retail and tourism. The sector as a whole is strongly influenced by international trends in technological

developments and the demand for services arising from economic cycles in Estonia and elsewhere. The sector is also under pressure from changes caused by demographic trends, which means that the sector is competing for labor with other sectors. Due to the cross-border nature of the field, labor prices are formed. According to the latest available data, there are 8,657 companies operating in the field of TLM, i.e. about one tenth of all Estonian companies. The number of companies in the field has grown at the same pace as all business in the last ten years - almost double. (OSKA 1)

OSKA TLM valdkonna ettevõtetes hõivatud

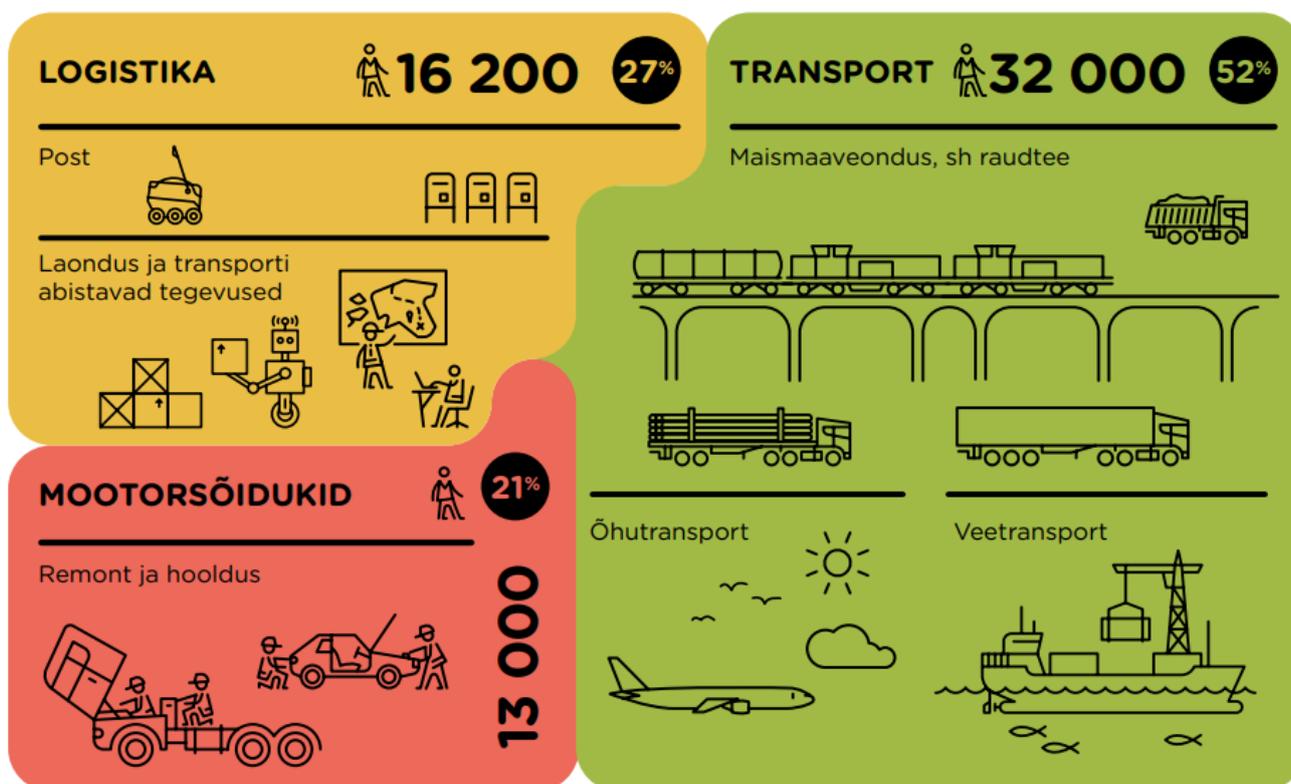


Figure 13. Employed in transport, logistics, repair and maintenance of motor vehicles
 Source: SA Kutsekoda, 15.01.2018

Labor demand will decline modestly over the next decade (around 3%). Growth is expected for transport and logistics managers and top specialists, pilots and air traffic controllers, highly qualified ship managers and ship engineers. There will be fewer positions for sailors, motorists, rolling stock workers and drivers. The number of jobs for warehouse workers, transport managers, customs declarants, postal workers and lifting

equipment operators will decrease in the future. The need for labor in the repair and maintenance of motor vehicles decreases moderately (approximately 8%). Motor vehicle and bodywork technicians training exceeds the demand. There will be more transport managers, motor vehicle and bodywork technicians trained than there will be professional work for them in the future (Figure 14, 15).

Töajoonõudluse ja -pakkumise võrdlus - ülepakkumine

Transpordikorraldajaid, mootorsõidukite ja keretõõde tehnikuid koolitatakse rohkem kui neile tulevikus erialast tööd jätkub.

Põhikutseala	Amet	Eeldatav haridustase, EKR tase	Hõive 2013/15 keskm + prog-noos	Nõudlus: uue töajõu vajadus aastas	Pakkumise ja nõudluse vahe	Pakkumine: lõpetajaid aastas (2012/13)	Eksperthinnang nõudluse ja pakkumise tasakaalu kohta
Logistikud	Tollideklarant	5-6 kutseharidus, RAK, BA/ täienduskursus	460 ↓	1			Koolituspakkumine transpordikorraldajatele ületab töajoonõudlust kordades.
	Transpordikorraldaja	4-5 kutseharidus	2 610 ↓	6	195	203	
Mootorsõidukite tehnikud	Autotehnik	4-5 kutseharidus	5 360 ↓	54	230	285	Koolituspakkumine ületab töajoonõudlust kordades (populaarne eriala). Töandjad eelistavad keskhariduse baasil autotehnikuid (14% lõpetajatest).
Keretõõde tehnikud	Automaaler	4-5 kutseharidus	490 ↓	9	82	91	Koolituspakkumine ületab töajoonõudlust märkimisväärselt. Töandjate hinnangul on tööturul keerulisem leida pigem autoplekkseppi kui automaalreid.
	Autoplekksepp		210 ↓	15	27	42	

- ↓ Mõõdukas vajaduse kahanemine (6-10%)
- ↓ Märkimisväärne vajaduse kahanemine (11-15%)

Figure 14. Main occupations with an oversupply of labor in transport, logistics, repair and maintenance of motor vehicles (SA Kutsekoda, 15.01.2018).

TLM valdkonna põhikutsealade hõive prognoos 2027 (3)

Põhikutseala / amet	Töötajate arv 2013/15	Töötajate arv 2027	Hõive muutus 10 a jooksul	Hõive muutuse selgitus
Mootorsõidukite alavaldkonna kutsealad				
Tehnikajuhid ja meistrid-töödejuhatajad	630	580	↓	Muutused töökorralduses ja juhtimismudelites, funktsiooni koondumine suurematesse ettevõtetesse ja investeeritud kaasaegsesse seadme parki vähendavad töömahtu. Diagnostika on kasvava olulisuse ja töajõu-vajadusega. Töajõu arvuline vajadus kahaneb, kuid oskuste vajadus kasvab.
Diagnostikud	890	990	↑	
Mootorsõidukite tehnikud	5 800	5 340	↓	
Keretõõde tehnikud	700	640	↓	
Mootorsõidukite kutsealad kokku	8 020	7 550	↓	
TLM valdkonna PKAd kokku	63 620	61 900	↓	Töajõu arvuline vajadus kahaneb, kuid oskuste vajadus kasvab.

- ↑ Mõõdukas vajaduse kasv (6-10%)
- ↓ Tagasihoidlik vajaduse kahanemine (1-5%)
- ↓ Märkimisväärne vajaduse kahanemine (6-10%)

Figure 15. Motor vehicle maintenance and repair employment forecast (OSKA1).

However, there is a need for more training for transport and logistics managers and top specialists, warehouse workers, public transport and truck drivers (Figure 16, 17). There is a shortage of purchasing specialists and warehouse managers trained after

secondary education. As the number of adult learners in VET increases, learning opportunities should be more flexible, updated and actual.

Tööjõunõudluse ja -pakkumise võrdlus - alapakkumine

Transpordi ja logistika juhte ja tippspetsialiste, laotöötajaid, ühissõiduki- ja veoautojuhte koolitatakse liiga vähe.

Põhikutseala	Amet	Eeldatav haridustase, EKR tase	Hõive 2013/15 keskm + prognoos	Nõudlus: uue tööjõu vajadus aastas	Pakkumise ja nõudluse vahe	Pakkumise lõpetajaid aastas (2012/13)	Ekspert hinnang nõudluse ja pakkumise tasakaalu kohta
 Transpordi ja logistika juhid, tippspetsialistid		6-7-8 RAK, BA, MA, DOK laojuhid kutseharidus, tase 5	8 160 ↗	205	-26	179	Nõudlus ületab pakkumist. Ettevõtjad tunnetavad tööjõupuudust ja näevad vajadust täiendavalt rakenduskõrghariduse tasemel ette valmistada tippspetsialiste, et vähendada pikemas perspektiivis hankejuhtide, tarneahela ja logistikajuhtide ning transpordiplaneerijate puudujääki.
	Logistikud	Ostuspetsialist	5-6 kutseharidus, RAK, BA	3110 →	45	-45	
 Laotöötaja		4-5 kutseharidus	9 850 ↘	139	-48	91	Nõudlus ületab pakkumist. Ekspert hinnangu kohaselt on vaja laotöötajate hariduspakkumist suurendada (5. tasemel).
	Töösteseadmete operaatorid	Kraanajuht, dokker	täienduskoolitus	550 ↓	8	-8	
 Ühissõidukijuhid	Bussi-, trammija trollijuht	täienduskoolitus (bussijuhtidel kutseharidus, tase 4)	4 320 ↘	165	-95	70	Pakkumine on märkimisväärse puudujäägiga nii statistiliselt kui ekspertarvamuse kohaselt. Suurenenud risk tööjõu väljavooluks Eestist. Kutselisi bussijuhte koolitatakse nii kutsehariduses kui ka ettevõtete poolt täiendkoolituse korras (nagu ka tramm- ja trollijuhte).
	Veoautojuhid			15 540 ↘	368	-221	147

↗ Mõõdukas vajaduse kasv (6-10%) → Vajadus püsib stabiilsena ↘ Tagasihoidlik vajaduse kahanemine (1-5%) ↓ Märkimisväärne vajaduse kahanemine (11-15%)

Figure 16. Main occupations of transport, logistics, repair and maintenance of motor vehicles with labor shortage. Source: SA Kutsekoda, 15.01.2018

TLM valdkonna põhikutsealade hõive prognoos 2027 (1)

Põhikutseala / amet	Töötajate arv 2013/15	Töötajate arv 2027	Hõive muutus 10 a jooksul	Hõive muutuse selgitus
 Transpordi ja logistika juhid, tippspetsialistid	8 160	8 810	↗	Tehnoloogia arengust ja tihenevast konkurentstist tulenevalt kasvab n-õ strateegilise juhtimise tähtsus logistikaprotsessides.
Logistika alavaldkonna kutsealad				
 Lennujuhid	160	180	↑	Tehnoloogia areng, funktsioonide automatiseerimine ja äriprotsesside jätkuv digitaliseerimine kasvatavad efektiivsust, vähendavad töömahtu ja hõivet.
 Logistikud				
tollideklarant			↘	
ostuspetsialist			→	
transpordikorraldaja	16 030	15 400	↘	
laotöötaja			↘	
 Postitöötajad	2 100	1 800	↓	
 Töösteseadmete operaatorid	760	660	↓	
Logistika kutsealad kokku	19 050	18 040	↘	

↑ Märkimisväärne vajaduse kasv (11-15%) ↗ Mõõdukas vajaduse kasv (6-10%) → Vajadus püsib stabiilsena ↘ Tagasihoidlik vajaduse kahanemine (1-5%) ↘ Mõõdukas vajaduse kahanemine (6-10%) ↓ Märkimisväärne vajaduse kahanemine (11-15%)

Figure 17. Employment forecast for transport and logistics managers and the logistics sector Source: SA Kutsekoda, 15.01.2018

3.2. Analysis of taxes paid by enterprises in a certain sector of the national economy

Compared to 2017, corporate costs increased by 11 percent, including labor costs by 10 percent. The number of persons employed and hours worked increased by 3 and 1 percent, respectively.

Companies invested 2.3 billion euros in 2018, which remained at the same level as in the previous year. As in the previous year, investments were mainly made in machinery and equipment and buildings. The largest investors were manufacturing, energy and trade companies, which accounted for almost half of the companies' total investments. Compared to 2017, investments in buildings and machinery and equipment increased. Other investments decreased, most of them investments in means of transport (PM Economy). Investment in technology is not yet attractive and beneficial in every field because the labor costs are often lower.

The activity of the companies in the field of accommodation, catering and tourism (MTT) cover 4% of all companies operating in Estonia, and 80% of them are micro-enterprises with up to 9 employees, which is less than the average in the economy. Half of the turnover in the field comes from catering, and the other half is provided by accommodation and travel

agencies and other activities. MTT's average salary is more than a third lower than the Estonian average. Those employed in accommodation receive a quarter of the average wage and as much as 43% in catering, being one of the activities in the economy with lower official wages, and the payment of informal wages is a problem in these activities.

Over the last 4-5 years, the average gross wage (including real wages) in the field of agriculture has grown strongly. Looking ahead, wage growth can be expected to continue over the next 5 years as current economic developments continue, but growth may be slightly more modest, given the inability of productivity growth to keep pace with wage growth. Wage levels in construction are at the same level as the economic average, but wage growth has been slower than the business average.

As a rule, employees in the ICT sector are well paid. The average salary in the sector is significantly higher than the average salary in Estonian companies. The highest salaries are in the field of programming and consulting and in the field of telecommunications, where the difference with the Estonian average is almost double. The value added of the ICT sector accounts for 7.1% of the value added created in the entire business sector.

Annual average labor cost per employee by economic activity in 2016 I Activity and Indicator

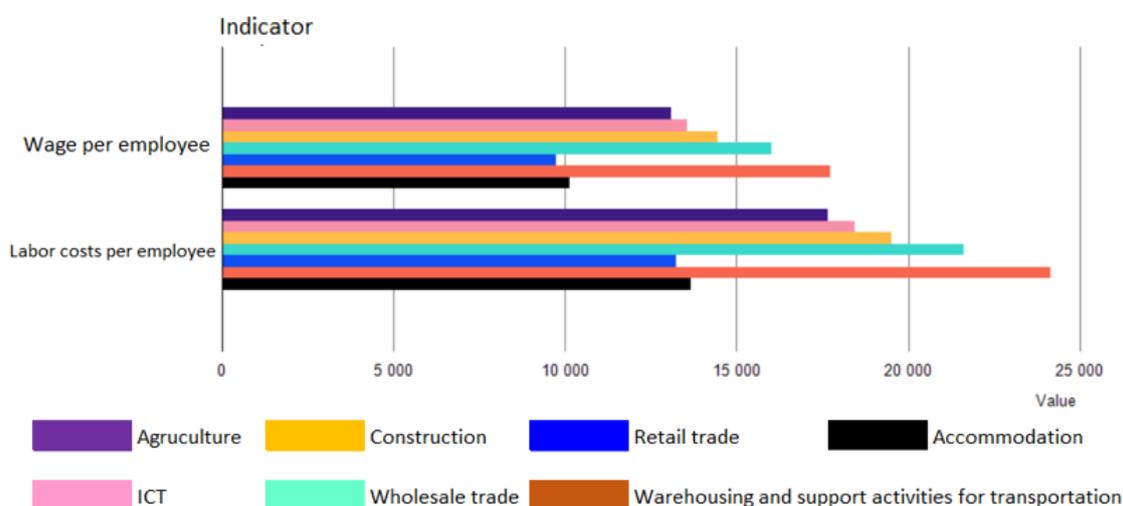
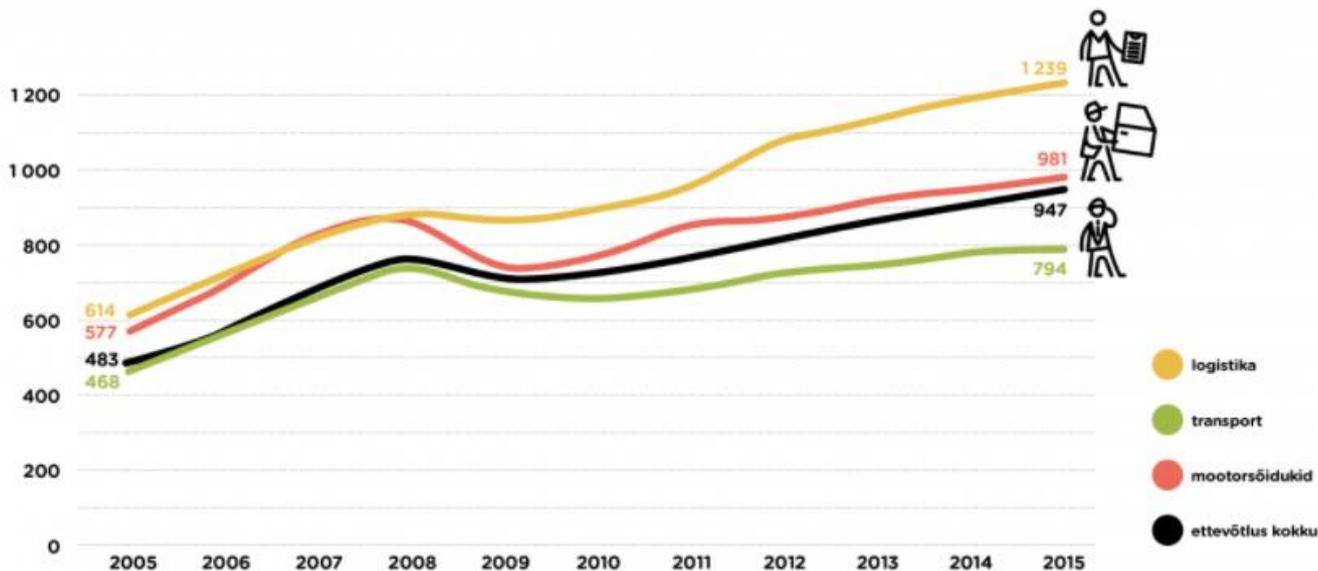


Figure 18. Annual average labor cost per employee by economic activity in 2016
Source: Statistics Estonia

While focusing on two areas of interest to us - transport, logistics, motor vehicle repair and maintenance and ICT - the graphs show the size of the pay gap by occupation. The wage

level in logistics is about a third higher, but in transport it is a fifth lower than the Estonian average (Figure 19).

Palk transpordi, logistika ja mootorsõidukite alavaldkondades



Allikas: Statistikaamet EM001

Figure 19. Wages in the transport, logistics, motor vehicle repair and maintenance sector, OSKA overview of the transport and logistics survey
Source: Statistics Estonia

Wages in the ICT sector and sub-sectors were significantly higher than the Estonian average already in 2015. The average wages in the sub-

sectors are very different - the salary increases significantly when moving along the career ladder (Figure 20).

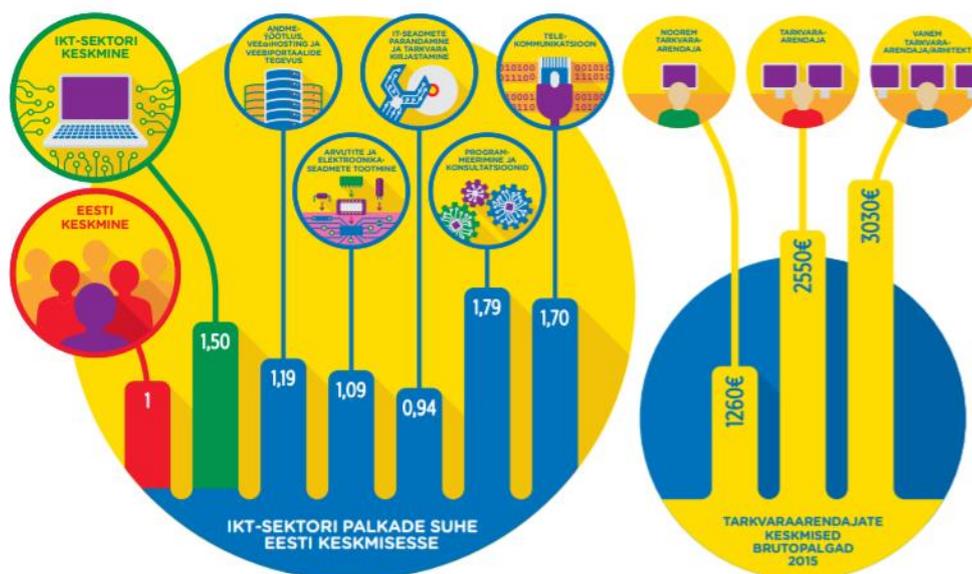


Figure 20. Wages in the ICT sector in 2015. In red - Estonian average gross salary, green - ICT average, blue - different sub-sectors, yellow - different levels.
Source: database of Statistics Estonia.

3.3. Analysis of labor productivity of persons working in enterprises of a certain sector of the national economy

Labor productivity as one of the production inputs, is usually measured in monetary terms and Statistics Estonia does so on the basis of both sales revenue and value added. In the case of sales revenue, the sales revenue is divided by the number of employees. In the case of value added, however, all costs (for outsourced goods and services, excluding labor) are first deducted from sales and then the result is divided by the number of employees. (Äripäev web).

Low-tech industries continue to predominate in Estonian industry. In the last five years, employment in medium-high-tech production

has increased the most. In most technology-intensive industries, more added value per employee is created. So far, simpler work has been done in Estonia in the high-tech field, therefore the added value created will remain smaller than usual in the branches with medium technology intensity. According to forecasts, the share of medium and high-tech production will increase. (OSKA 3)

The economic forecasts for the coming years show that GDP, average wages and productivity will continue to grow (Figure 21). At the same time, the economic forecasts of Eesti Pank (until 2020), the Ministry of Finance (until 2022) and larger commercial banks in the coming years forecast a slowdown in economic growth to 2-3%.

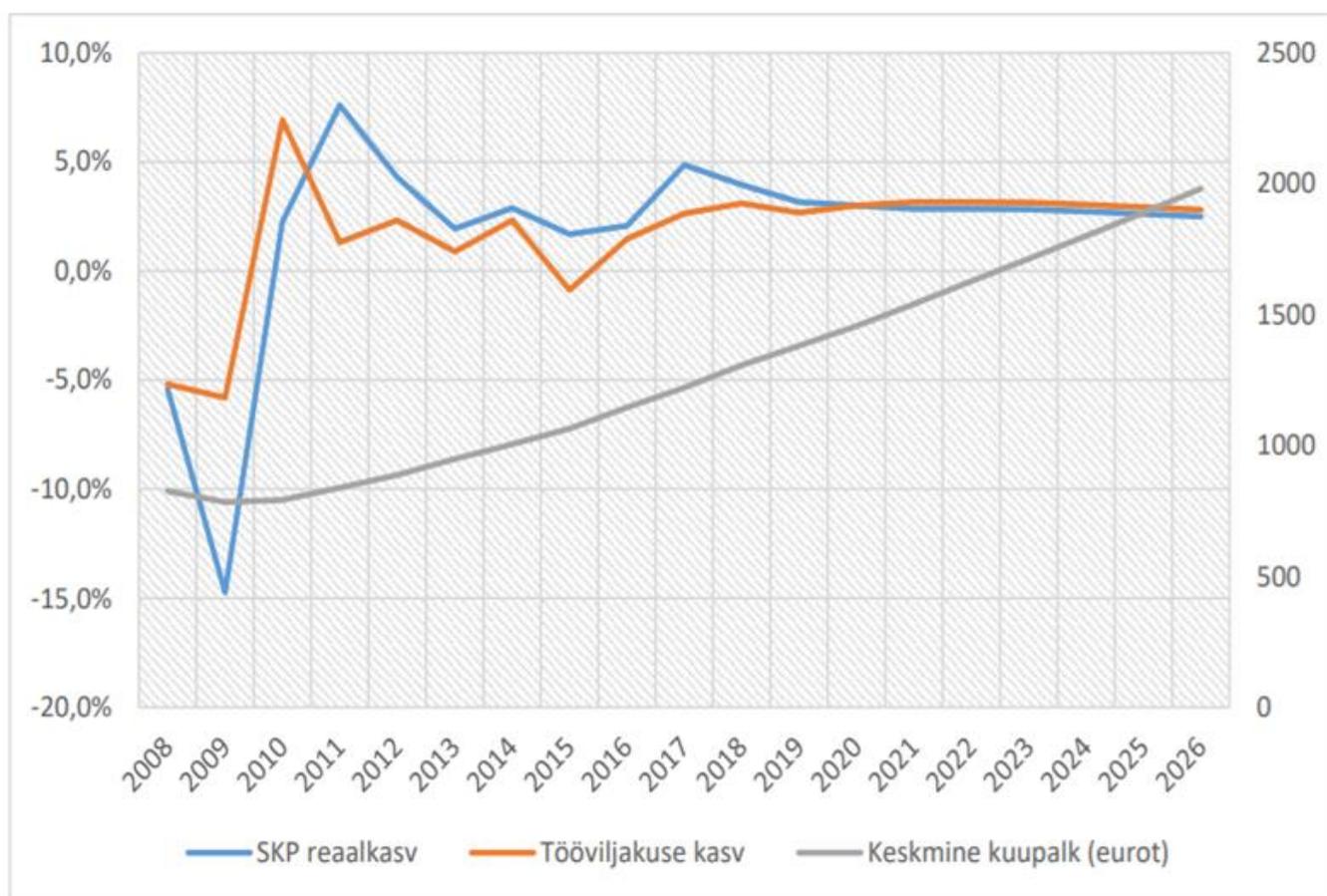


Figure 21. Changes in GDP, productivity and average monthly wages and short-term forecast. Source: Ministry of Finance. Long-term economic forecast

In 2018, the productivity of Estonian companies on the basis of net value added per employee averaged 23,900 euros, which is 5 percent more than in 2017 (PM Majandus). According to Statistics Estonia, Estonian companies earned a total profit of 2.9 billion euros in 2018, which was 4 percent higher than a year earlier. Commercial and industrial companies made the largest contribution to total profits. Although gross profit increased in most activities, growth was slowed down most by administrative and support service activities and construction companies. In 2018, companies sold goods and services for 61 billion euros - 10 percent more than a year earlier. The sales revenue increased the most in real estate and agriculture, forestry and fishing. The largest share in the sales revenue of the business sector is accounted for by trade and manufacturing enterprises, whose sales revenue increased by 9 and 7 per cent, respectively, compared to the previous year.

As an important source of added value, the construction sector plays an important role in the economy, but due to the high labor intensity, productivity has grown more slowly over the last decade compared to other sectors of the economy. The productivity of the sector is one-fifth of the Estonian average and twice lower than the average of European countries.

The ICT sector stands out in terms of high added value, export capacity and significantly higher-than-average wages, thus supporting important strategic development directions for Estonia. The value added of the ICT sector accounts for 7.1% of the value added created in the entire business sector. In the ICT sector, on average, labor costs accounted for 50% of value added, which is similar to the business average, where wages account for 53% of value added. The ratio of labor costs and value added is the highest in the field of programming and consulting, where labor costs account for 72% of the volume of value added (high wages have begun to limit the growth of companies).

3.4. Selection of Estonian economic sectors necessary for further research

Changes in skills in the near future are primarily related to technological trends. Digitalisation of transport, self-driving vehicles, electric vehicles, new business models - these are just some of the keywords that will change the need for labor in the future (OSKA 1). Currently, the largest activities of the Estonian economy in terms of the number of employed are

- wholesale and retail trade
- construction
- education
- transportation and warehousing
- industry (including manufacturing, mining, water supply and energy)

This analysis focuses on the areas/specialties taught at JKHK, where the demand for training the workforce that meets the needs of the labour market is the highest. Bearing in mind that the number of employed will remain stable over the next 10 years (659 000 employed in 2017 vs estimated 655 000 employed in 2026) but the structure of work and education will not remain the same because the need for labour will not remain the same, it is important to look into specialities and the future need among them.

At JKHK, there are five main study fields under constant need of improvement and adjustment because of the changing needs of the labour market:

- accommodation, catering and tourism services
- agriculture
- construction
- ICT
- transport, logistics, motor vehicle repair and maintenance

In this case study we analysed Estonian economic trends and prospects, looked into the number of persons employed in a certain sector of the national economy and analysed the labor productivity. **It is estimated that in the next decade, the number of people**

employed in the main professions will remain the same, but the need for training will change for many fields (due to stricter energy efficiency requirements, use of technology, demand, political issues, etc.). For example, the study in the construction field needs to be updated due to stricter energy efficiency requirements and the use of new technology. Transport, logistics, motor vehicle repair and maintenance sector is facing similar challenges. Top of this, the TLM sector needs to adjust its activities so that it arvestama the changes in political agreements and covid-related restrictions while meeting the needs of the consumer.

ICT is also facing challenges but it is expected that students gain better training and higher education before they start working for the ICT company. Yet, there are many micro-enterprises in this field Estonia, which also regulates the quality of work and productivity. Agriculture is facing a little bit of a different challenge as there are less young people entering vocational studies and higher education. Also, major investments have been made in the sector to increase productivity, which has reduced the need for labor. The number of small farms and people employed on their own farms has also decreased.

While the growing demand for accommodation, catering and tourism (MTT) services will be modest over the next 5-10 years (2%), the demand is on the rise among the following specialties taught at JKHK: chef, room attendant, catering customer service. At the same time, the supply of training already exceeds the need for a new workforce. The biggest problems in this sector are finding workers, irregular need for workers, low wages and high proportion of young people, many without any professional education.

4. Analysis of perspectives of training activities carried out by the Järva County Vocational Training Centre

4.1. Analysis of the portfolio of training programs implemented by the institution

Järva County Vocational Training Centre is the largest VET school in central Estonia and offers a wide range of professional training through its 40 curricula. The motto is „Learning is a matter of the heart!“ – it shows that we have students of all ages.

Our vocational training programs are based upon basic education and secondary education. In addition, we have pre-vocational learners and offer higher technical training for adult learners.

The school has around 1100 students and as many adult students who take part in additional training courses. Järva County Vocational Training Centre is the only public vocational school in Estonia offering full courses in fields of Equine management (Horse farming), Veterinary assistant, Water treatment operator and Road Construction.

There are five main study fields: Service, Economics, Engineering, Construction and Agricultural

Studies. The following specialities are being taught at JKHK's Paide campus: Logistics assistant, Freight forwarder, Freight Forwarder-Logistician, Warehouse manager, Warehouse worker, Computers and networks, Electrician, Cooking, Hotel services (Cleaning services & management), Care worker, Activity instructor for people with mental disabilities; and Säreveere Campus (located in the countryside 16 km southwards from Paide) Equine production and management, Fish farming, Veterinary assistant, Animal husbandry, Poultry farming, Sheep farming, Horticulture, Fur farming, Agricultural Production and management, Car technician, Vehicle technician, Vehicle maintenance/tyre technician, Diagnostics and repair for diesel powered cars, Heavy equipment operator, Armour technician-mechanic, Tiler, Mason,

Potter, Construction finisher, Restorer of stone and wood buildings, Water treatment operator, Road construction, Biogas stations manager.

The Järva County Vocational Training Centre (JKHK) is committed to providing students with diverse education and professional experience and developing teacher competencies so that they can further develop the knowledge, skills and attitudes of young people by supporting them to start a full-fledged professional and personal life.

The most popular training programs implemented by JKHK match with the main economic sectors, which puts the school under pressure in order to provide up-to-date and comprehensive study opportunities (Figure 22). The demand for in-service and retraining programmes has remained the same in the past few years (except for accommodation and catering sector, Figure 23). The current global economic situation and the health crisis of recent years have contributed to the growing need for training courses in ICT, transport services and wholesale and retail trade.

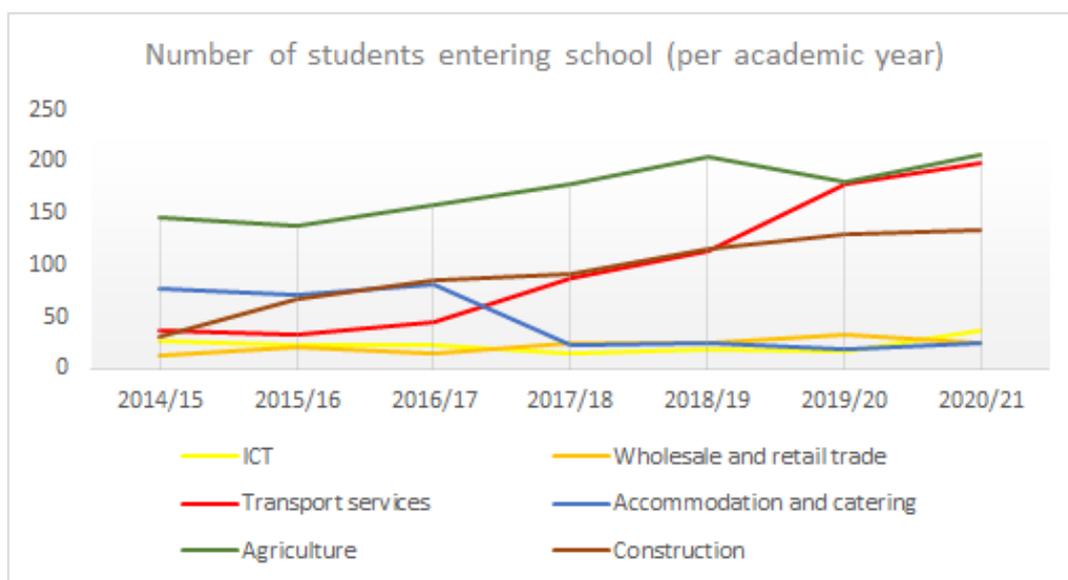


Figure 22. Number of students entering school in selected curriculum group
Source: Järvamaa Kutsehariduskeskus 2021

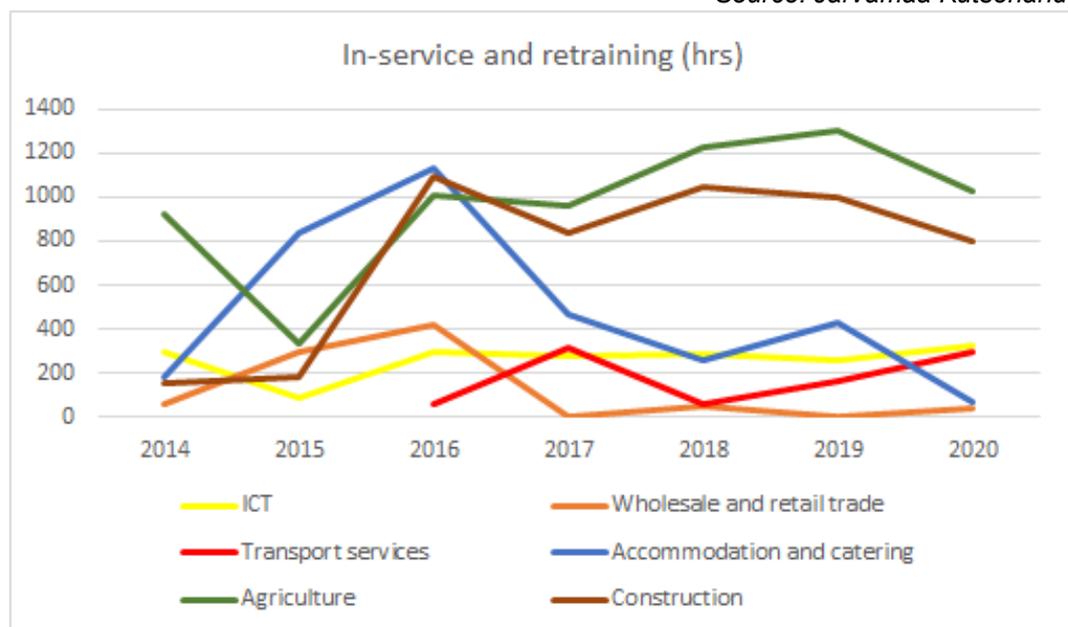


Figure 23. In-service training and retraining (in hours) in selected curriculum group at JKHK
Source: Järvamaa Kutsehariduskeskus 2021

When focusing on one curricula group that the labor market needs (for example Logistics), then JKHK has a very good graduation rate

(Figure 24, 25). Therefore it is important to keep the quality of the study programmes and constantly update the teaching methods.

Curriculum name	Study group	Year of commencement	Number of students started	Year of graduation	Number of graduates	Percentage of graduates	Studied in 2021
Warehouse manager level 5	LJ-17	2018 Jan	13	2018 June	12	92%	
Warehouse manager level 5	LJ-18	2019 Jan	9	2019 June	7	78%	
Warehouse manager level 5	LJ-19	2020 Jan	12	2020 June	8	67%	
Warehouse manager level 5	LJ-20	2021 Jan	19	2021 June	18	95%	19
Warehouse Worker Level 4 TKP	LT-19/õ	2019 June	10	2020 June	7	70%	
Warehouse Worker Level 4 TKP	LT-20/õ	2020 Oct	9				9
Logistics Assistant Level 4	LK-18	2018 Sept	12	2021 June	6		9
Logistics Assistant Level 4	LK-19	2019 Sept	10				8
Logistics Assistant Level 4	LK-20	2020 Sept	8				8
Freight Forwarder Level 4	VK-18	2018 Sept	13	2020 Feb	6	46%	
Freight Forwarder-Logistician Level 4	VK-19	2019 Sept	15	2020 June	8	53%	
Freight Forwarder-Logistician Level 4	VK-20	2021 Sept	18	2021 June	10		

Figure 24. Number of JKHK graduates by courses and years.
Source: Järvamaa Kutsehariduskeskus 2021

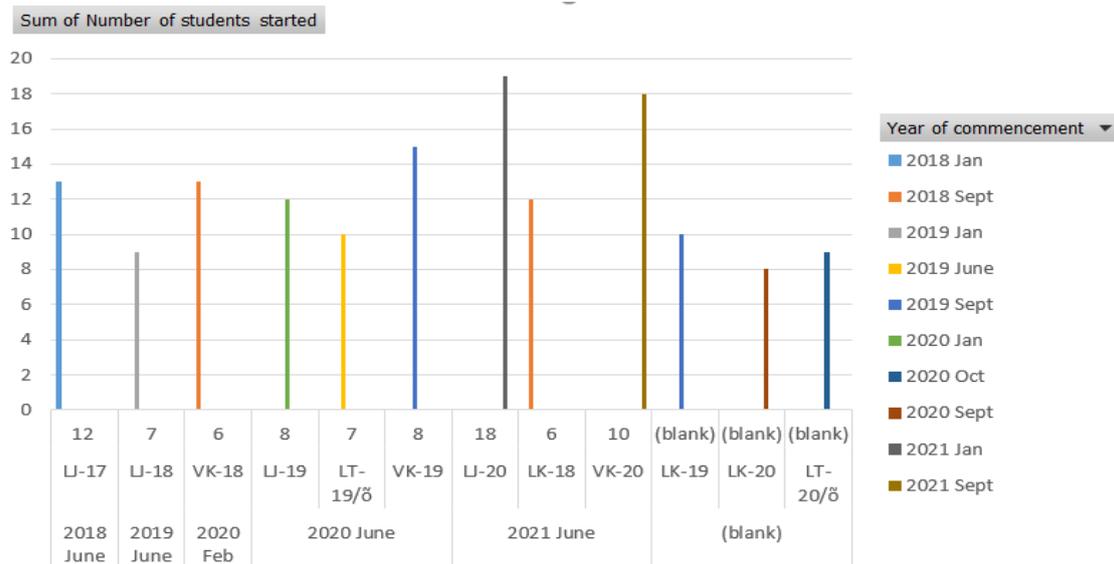


Figure 25. Number of JKHK graduates by courses and years.
Source: Järvamaa Kutsehariduskeskus 2021

4.2. Correlation of program implementation forecasts with the development tendencies of the national economy

OSKA field research results showed that there are too few skilled workers in construction. Finishers (painters) and potters study more than the need of the labor market. Most are missing construction specialties (structural builders, building systems specialists, carpenters, etc.). Yet, the content of the study needs to be changed as the need has changed - it has become more technical, new requirements, regulations to follow. 1.5 times more ICT specialists are needed in ICT, especially for other areas of life outside the IT sector but it is preferred for them to have at least bachelor's degree. In accommodation, food and tourism, a small increase in the number of employees is expected for managers of accommodation establishments, accommodation service providers and administrators, room attendants, chefs, chefs, guides and active people. There are many schools teaching this profession and are more specialised in that. There is an excessive training of motor vehicle and body technicians in transport and logistics, transport managers. There is a lack of top transport and logistics specialists, warehousing staff, public transport drivers, truck drivers, purchasing specialists, doctors.

The health of the Estonian economy depends quite a lot on how our main trade partners are doing and what is the foreign demand for Estonian products and services. The share of exports in GDP reached 78% in 2017, which is significantly higher than the EU28 average. Export volumes of products and services increased in 2017, and the long-term growth trend of services exports in particular could be highlighted. In five years (2012–2017), the export volumes of services have increased from 4.7 billion euros to 6 billion.¹¹ The growth has been driven by the sales success of Estonian companies' products and services as well as the fact that our main trade partners have also done well. (OSKA 3)

According to the forecast, in the ten-year perspective, the labor demand in the TLM (Transport, logistics, repair and maintenance of motor vehicles) sector as a whole will decrease modestly (-3%):

- The share of job losses is highest in the motor vehicle sub-sector (approximately 8%), where only the diagnostics profession maintains a moderate need for growth.

- In the sub-sectors of transport and logistics, there is a modest (about 3%) decrease in labor needs, which is mainly affected by the expected changes in the professions of skilled and administrative workers (warehousing and postal workers, transport officials, motorists in the last two years of the forecast period). (OSKA 2)

There are several contradictions in the structure and content of the professional training offer in the field between the current offer and the real needs of companies:

- According to experts, it is important to regularly update the content of curricula in the field of logistics and transport based on future trends in the field and technological developments. Learning methods should be diverse and allow for more flexible learning arrangements. Vocational education institutions could become so-called competence centers in the field in order to encourage the maximum use of existing investments.

- in the sub-field of logistics, there is an oversupply at the level of vocational education in the profession of logistics, there is a shortage of purchasing and warehousing specialists and warehouse managers trained on the basis of secondary education

- The logistics sub-sector needs more innovative and development-oriented supply chain, procurement and logistics managers. (OSKA 2).

5. Description of the results of the round table discussion

A member of Estonian Supply Chain Management Association, member of the vocational committee, representative of employers and representatives of vocational schools discussed the current situation in the observed sector from the point of view of both the company and the school, and agreed with the views expressed in the OSKA reports and the prevailing trends in logistics:

- Individual customer shipments become smaller,
- more frequent orders,
- Expectations for delivery speed and accuracy are growing (similar trends are in e-commerce). In order to offer the most suitable and high-quality “tailor-made service” and to stay competitive, companies in the field are under very strong pressure to take into account trends, automate and optimize their operations.

- Trade flows have become more volatile and it is increasingly important for employees to have management, analysis and planning skills. All the more so as no significant increase

in automation is expected over the next 5 years, as labor costs are lower than the costs of developing and implementing automated systems, but the growth trend in trade (especially in e-commerce continues).

- Due to global trends, the training of employees entering the field is becoming increasingly important. Schools must provide students with a variety of basic professional knowledge and skills - in the field of warehouse worker and warehouse manager, there are also problem-solving and adaptation skills.

- Conceptual and strategic thinking, knowledge and use of sector-specific technological possibilities and ICT solutions are important for the development of the field. Particular emphasis must be placed on the ability to process, analyze and synthesize information, which cannot be done in logistics. The roundtable discussions also addressed the topic of study materials. The teaching materials in the field need to be modernized and adapted to the level of vocational education. In the situation of distance learning, there was a lack of materials that included the students' activity and were not attractive to them. The situation of study materials has also been studied at the national level: in 2019 the curriculum of Innove Foundation was mapped, within the framework of which the study material was mapped. In the curriculum group of transport services, JKHK participated in the mapping of the study material of logistics specialties. The analysis of the study material was primarily based on the most used materials. Relevant information was gathered from various sources, and in addition, as vocational teachers, we had a long-term experience of what teaching materials are available and useful based on the learning outcomes. As a result of this, it became clear that there is rather a lack of high - quality study materials suitable for the level of vocational education, and that the tasks of a warehouse worker require additional tasks and materials related to warehousing processes and operations. The competencies given in the professional standards must be used when creating study materials.

The following is an overview of the professional competencies of the Warehouse Manager, Level 5 and Warehouse Worker Level 4 on the

basis of professional standards that would need to be developed as a priority:

Warehouse manager, level 5 based on the professional description A.1:

The warehouse manager works independently or in a team, being the team leader. S/he is able to independently orient himself in different situations, solve problems, communicate correctly with customers and co-workers, and choose and apply modern warehousing and information technologies, methods and tools to find new solutions.

The warehouse manager is responsible for the storage of stocks and the prudent use of warehouse-related assets. (Professional register)

In addition to the performance indicators of the professional standard B.2.4 point 1-4:

1. Plans warehouse storage areas and storage areas, work areas and other storage areas according to the parameters of goods and trade flows;

2. Plans suitable warehousing technologies and warehousing equipment according to the parameters of goods and trade flows and the capabilities of the company;

3. Makes reasoned proposals for the selection of warehouse accounting software, warehouse management systems and other professional software;

4. Plans warehousing operations based on the company's main processes (production, purchase, sale, etc.); (Professional register)

In addition, **Warehouse Manager, Level 5** competence in professional standard B.2.9:

1. Acts purposefully and responsibly, observes the requirements of occupational health, safety and environmental protection;

2. Understands the whole process of warehouse operation and the content and goals of the work of different subdivisions of the company;

3. Assess the risks of damage and accidents related to storage and implement measures to reduce the levels of risk;

4. Uses storage equipment and other tools efficiently, prudently and sustainably;

Warehouse worker, level 4 competence in professional standard B.2.5

2. Understands the whole process of warehouse operation and the goals of different subdivisions of the company; (Professional register)

Based on this competence, it can be said that the warehouse employee also needs to understand the functions and goals of the different work areas of the warehouses and the technologies and solutions necessary for efficient work. In order for a warehouse worker to work motivatedly, he or she needs to understand the impact of what has been done in his or her work on the entire chain.

Our goal with the planned hybrid simulation/modellation is to enable the student to respond to changing situations and justify his/her job choices based on theoretical knowledge, and the simulation should allow the student to spend as little time as possible on the technical design and drawing of the solution.

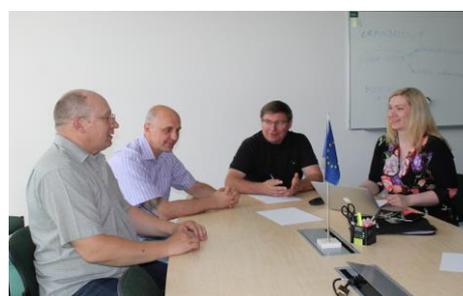


Figure 26. Round table meeting: Estonian Supply Chain Management Association (PROLOG), member of the vocational committee, representative of employers and representatives of vocational schools, Source: private collection

Conclusions

According to the research, the growing demand for **accommodation, catering and tourism (MTT) services** will be modest over the next 5–10 years (2%), the biggest problems are finding staff and low wage and irregular working periods. Therefore, the staff changes quickly and often people without the appropriate education are hired. Also, there are many schools providing this education.

The number of employed has remained relatively stable in the last 5–10 years in **agriculture sector** (including fisheries and the food industry, PMTT), but it is estimated to decrease in the next 5–10 years. The labor needs and training provision of most of PMTT's main occupations are balanced - in the main occupations of all specialists as well as several skilled workers. In the future, there may be a shortage of young workers with vocational and higher education entering the labor market, but with all graduates, supply and demand would be in balance.

In the next decade, the number of people employed in the main **construction** professions will remain the same, the need for training (e.g. stricter energy efficiency requirements, use of technology in construction) will change, as it is often not considered necessary to train new.

In order to increase the number of **ICT** (electronics, software development, ICT systems and services, telecommunications and cross-sectoral management) specialists, more people must be ready for retraining or willing to start studying at the higher level. The total number of entrants is well above the projected need in the field of ICT, but the drop-out rate is high (higher than the Estonian average and also the average of European computer science students), i.e. almost every fourth student in ICT curricula. Nevertheless, vocational education in the field of ICT is offered in 18 schools, of which 11 vocational education institutions have received full accreditation. Demand for vocational

graduates in the field of ICT is significantly lower and the forecast does not see any change in the employment of ICT specialists. At the same time, staff with at least a BSc degree are preferred.

The economic booms led to an increase in jobs in **wholesale and retail trade**, but the employment is estimated to fall slightly in the near future. There is a shortage in a few occupations in this sector, but JKHK does not offer courses for these occupations.

Labor demand will decline modestly over the next decade (around 3%) in the **Transport, logistics, motor vehicle repair and maintenance sector**. Growth is expected for transport and logistics managers and top specialists. Logistics and transport are important service providers for the whole economy, from industry to retail and tourism. The demand for services arising from economic cycles in Estonia and elsewhere. The sector is also under pressure from changes caused by demographic trends, which means that the sector is competing for labor with other sectors. Technological developments, new market entrants, innovative business models and changing consumer expectations create both additional opportunities and challenges. The general skills of new employees need to be developed. Good basic knowledge of science and languages are essential. Also, communication, analysis, management skills and continuous self-improvement, entrepreneurship and adaptability help to be successful in the labor market. Therefore, JKHK found that for, the most efficient and valuable is to focus on three curricula while creating a hybrid simulation/model.

Curricula applied in logistics level studies:

Warehouse manager, level 5 (there are only two schools in Estonia that offer education on the basis of this professional standard)

Warehouse worker, level 4

Transport manager - logistics, level 4

All level curricula in the field of logistics deal with warehousing processes, warehousing operations and technologies, equipment and machines used in warehouses. Topics covered in these curricula that are directly related to JKHK's hybrid-idea.

Reference:

OSKA1: https://oska.kutsekoda.ee/wp-content/uploads/2016/04/TLM_terviktekst.pdf

OSKA 2: SA Kutsekoda 2017

https://oska.kutsekoda.ee/wp-content/uploads/2016/11/transport_logistika.pdf

OSKA 3: OSKA uuringuaruanne, Eesti tööturg täna ja homme, 2018 <https://oska.kutsekoda.ee/wp-content/uploads/2018/12/Eesti-t%C3%B6%C3%B6turg-t%C3%A4na-ja-homme-2018.pdf>

PM Economy, 27 February 2019 <https://majandus.postimees.ee/6532840/keskmise-tootaja-toimullu-firmale-25-000-eurot-puhast-kasumit>

Äripäeva veeb <https://www.aripaev.ee/arvamused/2015/03/08/kas-viljakas-too-voib-olla-kahjumlik>