European Foundation for the Improvement of Living and Working Conditions

Employment growth and skills needs in selected sectors in Latvia

Background paper

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Introduction

This report looks at a number of sectors:

- Electromechanical engineering (NACE 29 and 31);
- Chemicals, pharmaceuticals, rubber and plastic products;
- Non-metallic materials: glass, cement, ceramic, etc.;
- Computer, electronic and optical products;
- Transport and logistics;
- Health and social work.

These sectors are of importance for the Latvian economy. All sectors listed have been examined in the European Commission's comprehensive sectoral analysis of emerging competencies and economic activities conducted in 2008–2009 in cooperation with Eurofound. For this background paper, Eurofound has extracted information from the EU-wide overview, with the aim of highlighting results that are of particular relevance for Latvia.

Electromechanical engineering 1

The importance of the sector in Latvia

The Commission's analysis of the electromechanical sector comprises the manufacture of machinery and equipment (NACE 29) and the manufacture of electrical machinery and apparatus (NACE 31) (European Commission, 2009a).

Little information is available regarding the characteristics and quantitative trends of the sector in Latvia in the report. For the machinery and equipment sector, it is clearly stated that in the three Baltic countries 'the industry is relatively unimportant' (p. 5). Figures provided for Latvia for 2005 state that value added was 0.6% of the total output of the economy and employment in the sector was 0.6% of total employment (p. 6). For the electrical equipment and apparatus sector, the figures are given as 0.3% of the total, again for both value added and employment (p. 7).

This data is not necessarily in line with figures provided by the Association of Mechanical Engineering and Metalworking Industries of Latvia (MA). Output of the mechanical engineering industry in 2004 was 23% of the total, with the machinery and equipment sector (NACE 29) contributing 15% of the sectors output and electrical equipment and apparatus (NACE 31) contributing 9%.[1]

It is not the purpose of this paper to establish the importance of the electromechanical engineering sector for the Latvian economy. However, as it takes the sector analysis of the European Commission as our starting point, data and information related to the new Member States (NMS) as a group will have to be used, since hardly any facts are provided specifically for Latvia.

Europe-wide trends for output and employment

Electromechanical engineering is a key export sector for the EU, accounting for 21% of EU exports of goods to the rest of the world. The sector has a sizeable trade surplus and has increased its share of global markets for most of its products.

In spite of this, the contribution of the machinery and equipment sector (NACE 29) to output in the EU as a whole declined over the 10 years from 1995 to 2005 (as it did for all of manufacturing). This was the case for most of the EU15 countries as well as for the NMS.

The picture is somewhat different for the electrical equipment and apparatus sector (NACE 31). The contribution to output tends to be larger in the NMS than in the EU15. On average, output contributes 1.3% to the output of the overall economy – more than in any EU15 country apart from Germany and Finland. Moreover, in a range of new Member States, the contribution of the sector increased significantly over the four years between 2001 and 2005 (including in Estonia and Lithuania). In most EU15 countries (with the exception of Germany, Finland and marginally France), the proportion of value-added produced by the sector either declined or remained unchanged. A shift of production to the NMS seems to have occurred.

This is also reflected in the employment figures for NMS for the electrical equipment and apparatus sector: employment in this sector grew by 2.6% per year between 2000 and 2005 – much the same rate as it declined in the EU15 over the same period.

[1] www.liaa.gov.lv/get_file.php?file=uploaded_files/publication_files/3398.pdf

For machinery and equipment (NACE 29) the picture for the same time period is quite different: employment decreased in the EU as a whole with falls in the NMS even sharper than in the EU15.

Drivers of change

The sector is particularly affected by cyclical economic fluctuations. Job losses tend to be large in economic downturns. A key economic driver is the rate of European and global economic growth. For the subsector of electrical machinery (NACE 31), demand in Europe is more important, as it is more focused on European and national markets. Demand on these markets will be influenced by the liberalisation of the EU energy market.

The geographical location of the end-product producer is of key importance. Suppliers and their subcontractors often need to locate the facilities close to their customers. This is an advantage for European suppliers as long as end products continue to be made in Europe. It also means that expansion into markets in other parts of the world will encourage relocation away from Europe.

Currently, the structure of the electrical machinery sector (NACE 31) in the NMS seems to be mainly driven by outsourcing from the EU15 and changes in product specialisation following enlargement. This raises the question of the sustainability of these activities and the danger of them being moved further east.

A key technological driver is 'hybridisation', the combination of electronics and mechanics into 'mechatronics' and an increasing openness to innovative methods and processes.

Within companies, we see an increased integration of design, technology and management. For the machinery and equipment industry, this means that design and product prototyping phases are run in parallel with the development of equipment to produce the new product in order to reduce time to market.

In the electrical machinery and apparatus industry, a key driver is the need to reduce energy consumption for producers of the equipment as well as for users of it. This includes the drive to exploit alternative energy sources.

The above drivers point to the increasing importance of product and process innovation in the sector. The innovative capacity of companies, the quality of their products and respect for delivery times are key determinants of business performance.

Emerging skills and competencies

Evidence from the period 2000–2007 (see Figures 1 to 4) shows that the structure of employment in the electromechanical sector is moving towards more highly qualified jobs, away from traditional skilled manual jobs. The changes that have occurred in the occupational structure of employment across the EU show both common features and differences between the two parts of the electromechanical sector.

A number of key trends were observed in the structure of jobs over the period 2000-2007 in the machinery and equipment sector.

- In the EU15, an expansion took place in the number of engineers and other professionals as well as electricians and low-skilled workers; at the same time, there was a reduction in jobs requiring traditional skills – tool makers, metal moulders and mechanics – and in jobs for office staff.
- In the NMS, an expansion in demand took place for metal moulder and mechanics in terms of skilled workers. However, there was a reduction in demand for other skills, as well as for semi-skilled operators; this was especially the case for machine operators. There was also a slight reduction in demand for managers and professionals and a bigger reduction for toolmakers (implying an overall decline in jobs for skilled manual workers).

The differences between the EU15 and the NMS for the same period were even greater with respect to the electrical equipment industry.

- In the EU15, there was an expansion of jobs for managers and other professionals, as well as for electricians and – to a lesser extent – mechanics. At the same time, there was a decline in jobs for office workers and, above all, for machine operators.
- In the NMS, some growth in demand for engineers took place, as well as for metal moulders. However, the greatest growth in demand was for semi-skilled workers – i.e. machine operator. At the same time, there was a substantial reduction in jobs for skilled workers.

Figure 1: Percentage point change in division of employment in mechanical engineering in EU15, 2000–2007

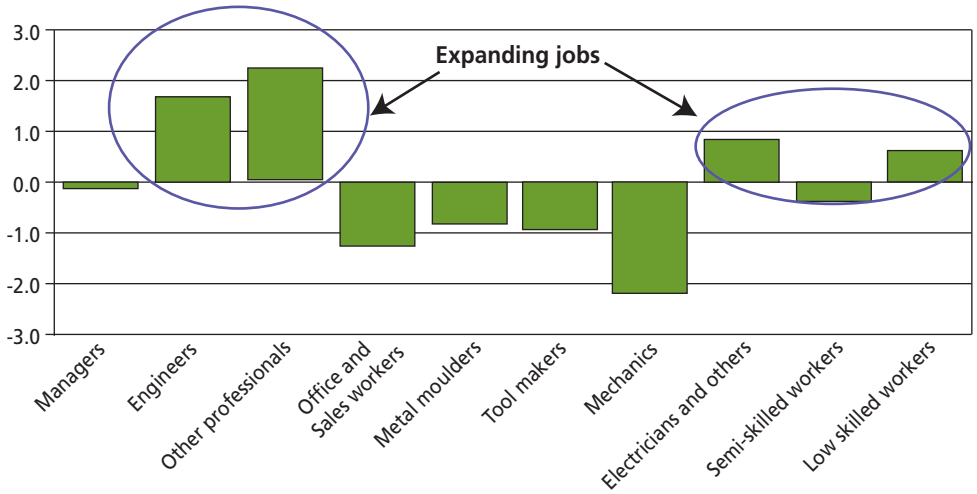


Figure 2: Percentage point change in division of employment in mechanical engineering in NMS, 2000-2007

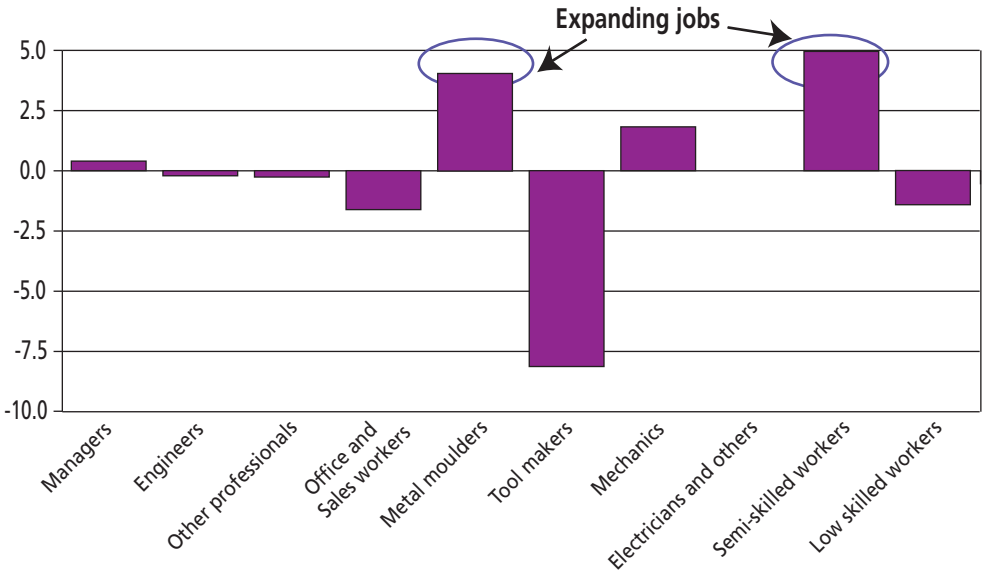


Figure 3: Percentage point change in division of employment in electrical engineering in EU15, 2000-2007

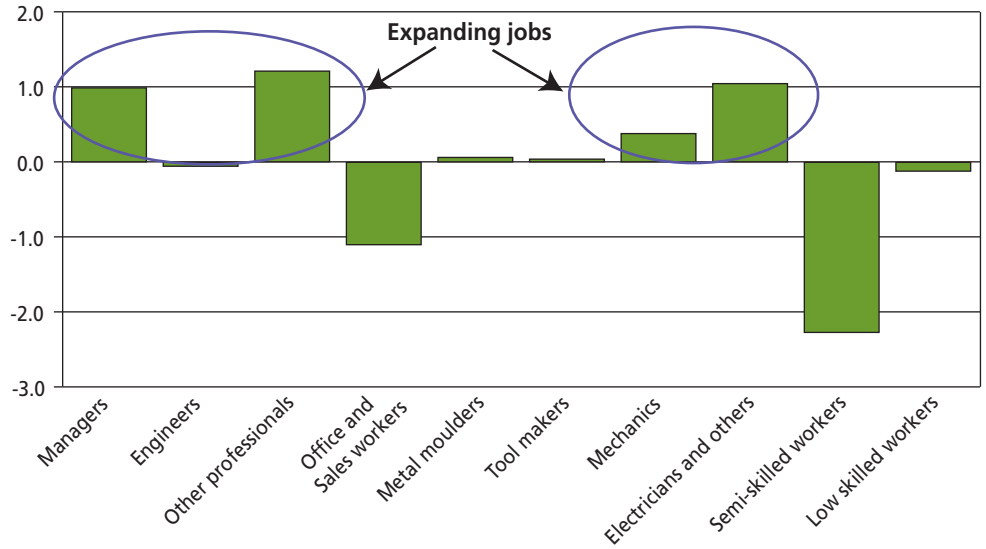
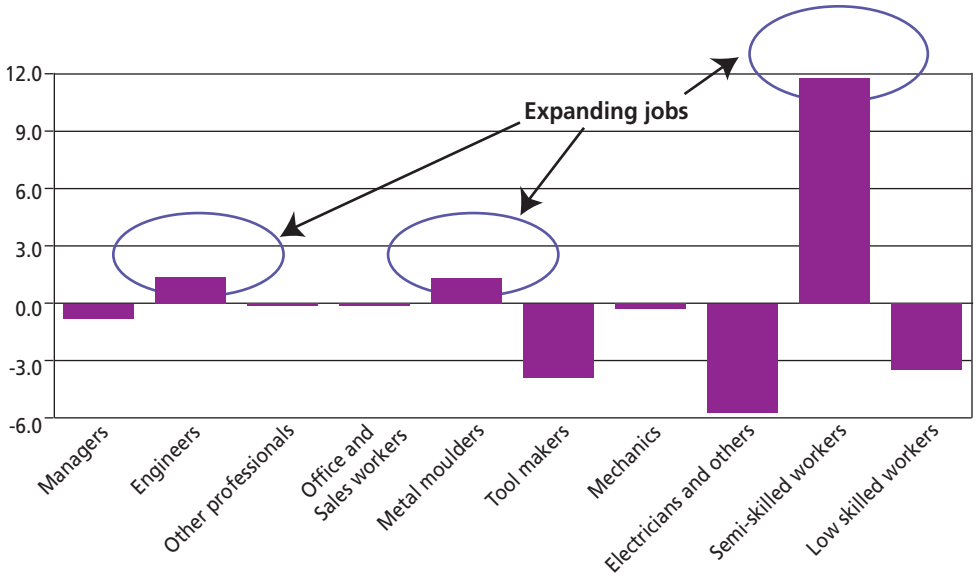


Figure 4: Percentage point change in division of employment in electrical engineering in NMS, 2000-2007



The shift towards jobs for managers and professionals has increased the demand for people with relatively high levels of education, while the shift away from manual and semi-skilled workers has reduced the demand for people with vocational training qualifications. At the same time, there has been an increase in education levels within occupational groups.

The scale of the overall effect, however, varies across countries. In the case of engineers, between 65% and 70% of those employed in the sector have university degrees or the equivalent in Germany and Finland; by contrast, the figures in Italy and Czech Republic are only 15% and 24%.

For other professionals, the proportion with a tertiary level education in the EU15 varies from 66% in Finland and 53% in the UK to 19% in Italy. In the NMS, it averaged 57%, though it reached only 28% in the Czech Republic. A similar variation exists for skilled and semiskilled manual workers.

Changes within occupational groups have also varied across countries, though there are common features. In particular, the proportion of workers with no qualifications beyond basic schooling has declined in recent years in all occupations in nearly all countries – in some cases, markedly – with a general increase in tertiary education in professional jobs.

Scenarios and implications for the future

What impact will the economic crisis have on the electromechanical engineering sector and will an upturn lead to a rapid expansion of employment in the sector?

The Commission study distinguishes three possible scenarios for the development of the sector between 2010 and 2020. The employment scenarios are based on possible trends in output and the relationship between

output and productivity growth. Developments between 1995 and 2005 indicate that when productivity grew faster than value-added, employment levels dropped; hence, an increase in output alone does not necessarily lead to an increase in the number of jobs.

The question, therefore, is, will employers – as in 2001–2003 – try to maintain employment levels, and allow productivity to decline? Or will they, as in the early 1990s, undertake significant restructuring to maintain productivity growth, and so precipitate a sharp fall in employment?

Scenarios for 2010–2020

The pace of the post-downturn recovery depends on the competitiveness of the industries that emerge, as well as the market conditions they face. Three scenarios have been constructed for 2010– 020. In these scenarios, the impact of the various drivers of change on employment are, in effect, reflected in the assumptions about (endogenous) changes in productivity growth and (exogenous) changes in economic growth.

The first scenario assumes that the EU economy and the electromechanical sector continue in much the same way as they did over the past 10 to 15 years – a 'business as usual' scenario. If past trends prevail, little employment growth can be expected in either subsector, given the offsetting growth in productivity. The main areas of growth in the EU would be in electrical engineering in the NMS. They would gain around 7.3% of employment over the 10-year period. No gains would be achieved for mechanical engineering.

The second scenario assumes that the sector achieves higher output due to both a higher rate of growth of the EU economy and increased competitiveness. In terms of employment, however, the positive effect on jobs would be offset by the increased productivity needed to increase competitiveness. (This would be achieved through more automated and less labour-intensive methods of production, greater use of R&D, improved energy efficiency etc). For the NMS that would mean growth in employment in mechanical engineering of almost 10% (almost as high as for the EU15), and of nearly 18% for electrical engineering (compared with 10% for the EU15).

The third scenario assumes that the sector increases its productivity and competitiveness, as in the second scenario, but that this does not lead to higher sales because of sluggish growth in demand. Under such a scenario, with growth no higher than in the past (for example), job losses would continue. Employment growth would be limited to the electrical engineering sector and would only occur in the NMS.

Consequences for competencies and occupations

In the case of mechanical engineering (NACE 29), the relative importance of most jobs for professionals and technicians can be expected to increase up to 2020, at least in the EU15 countries. The the relative importance of jobs for manual workers can be expected to diminish, with the exception of electricians (reflecting trends towards computerisation and digital-control methods).

In the new Member States, some jobs for skilled manual workers in mechanical engineering (metal moulders and mechanics) seem set to increase, along with significant increases for semiskilled production workers,

though long-run prospects are uncertain since the current migration of labour-intensive activities from the EU15 could shift further eastwards.

Changes in the skill structure of employment in electrical engineering (NACE 31) are similar, though skilled manual jobs in EU15 countries are not expected to decline and could even increase. The shift from semi-skilled workers on production lines could become more pronounced.

Developments in the NMS in electrical engineering are largely the mirror image of trends in EU15, with a sharp drop in demand for skilled manual workers as jobs in domestic firms are replaced by less-skilled production line work coming from the EU15.

A shift in the composition, or relative importance, of competencies, however, does not in itself say anything about absolute changes in job prospects. By combining trends in skill structure with projections of total employment, it is possible to indicate the extent to which the demand for specific skills is likely to grow or decline in the future.

The most important projection here is that the demand for highly qualified professionals, as well as for engineers and computer scientists, is likely to be significantly higher in 2020 in the EU15 as well as the NMS, raising questions about the industry's ability to recruit qualified people in the numbers required in the face of competition from other parts of the economy.

In terms of age groups, around 25% of engineers in the EU15 and over 30% in the new Member States are aged 50 years or over, and the same is true of skilled manual workers in a number of Member States. This could lead to future skill shortages and problems in recruitment if rates of retirement exceed the rate of decline in demand for such skills.

Strategic choices and recommendations

The electromechanical engineering sector has been highly successful in global markets but it will be badly hit by the current downturn. Moreover, wide-ranging structural changes – including in product markets, technological applications, workplace practices, and the regulatory environment (notably climate change and energy) – are affecting the sector.

This will have a major impact on the skills and competency requirements of those employed in the sector, whose performance between now and 2020 will depend on how the industry, and its subsectors, deal with the impact of the recession on its existing workforce, and how well it prepares for the post-recession environment. Performance will also depend on how regulatory changes at EU level, notably the opening up of energy markets, work to the benefit of EU-based companies, and whether the EU develops specific policies for the sector or leaves that essentially to Member States specialised in engineering.

The electromechanical sector is facing three key pressing human resource problems.

- The industry is failing to recruit enough of the graduates who leave universities with engineering or other appropriate qualifications.

- Engineering and scientific graduates emerging from university-level institutions do not always have the right combination of skills and competencies.
- There are no clear or consistent indications of how the new kinds of intermediate-level technical and practical competencies and skills required in a 'post-manual labour' workplace should be developed, taught and certified.

The shift in the electromechanical sector towards more jobs for managers and professionals is increasing the demand for people with relatively higher levels of education, while the shift away from manual workers, and semi-skilled workers in particular, reduces the demand for people with vocational training qualifications.

Chemicals, pharmaceuticals, rubber and plastic products

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The importance of the sector in Latvia

The Commission's analysis of the chemicals industry is based on the NACE Rev 1.1 classification and encompasses chemicals and chemical products (NACE 24) and rubber and plastic products (NACE 25).

Little information is available on the characteristics and quantitative trends of the sector in Latvia. The report on the sector, commissioned by the European Commission, states that 'in the ten NMS the chemicals industry is still rather small in comparison to the old Member States' (European Commission, 2009b). Figures provided for Latvia for 2006 show that employment in the chemicals and chemical products as well as rubber and plastic products was for each below 0.4% of total employment in the economy.

The report does not present data on the output of the sector in Latvia; however, figures provided by the Latvian Statistical Office indicate that in 2006 the gross value added of the chemical industry was around 0.9% of the total output of the economy with manufacturing of chemicals and chemical products contributing 0.5% and rubber and plastic products contributing 0.4%. This appears to be far below the EU27 average. The report states that in 2006 chemical sector in EU27 generated €322 billion of value-added, which is equivalent to 2.8% of GDP in the EU.

Europe-wide trends for output and employment

Over a 10-year period, production in the EU27 of chemicals, pharmaceuticals, rubber and plastics rose steadily and continuously until 2006. The rate of output growth in the chemicals sector (an annual average of +4% during the period 1995–2006) outpaced that in the whole industry (+2.3%). The strongest expansion occurred in the pharmaceutical industry (+6.1%), and in manufacturing of basic chemicals (+3.7%). In contrast, the EU27 registered a notable contraction in the production of pesticides and other agrochemical products (-2.4%) and man-made fibres (-2.4%).

In 2006, the EU chemicals, pharmaceuticals, rubber and plastic products sector employed 3.75 million people. For the period 1995–2006, annual employment growth was slightly negative in the EU15 (at -0.4%), but positive in the NMS (+1.6%). The picture of employment growth is differentiated at the subsector level. Employment in the manufacture of chemicals and chemical products declined steadily in the EU27 during the period 1995–2006, at an average rate of 1.5% per year. In contrast, employment in the manufacture of rubber and plastic products grew at an average rate of 0.7% per year. The growth in the rubber and plastics products sector was particularly strong in the Baltic States, including Latvia, reaching an average of more than 8% per year.

Drivers of change

A number of key trends are driving change in the sector:

- environmental as well as security and safety regulations, stemming from initiatives such as REACH, ETS, ELD;
- growth in demand driven by emerging economies;

- an increasing role played by outsourcing and offshoring – the chemicals industry is affected by the offshoring of user industries, leading to new investments primarily outside Europe; offshoring and low-wage production is important primarily for the rubber and plastic products sector; outsourcing plays an increasingly important role in the pharmaceutical industry;
- growing demand for environmentally friendly products – important for the chemicals industry as a supplier of materials and solutions for new technologies;
- the availability and price of oil and energy: with the importance of carbon for products in the chemicals, pharmaceuticals and rubber and plastic products sector, the availability and price of energy is important for all sectors; it is, however, crucial for energy-intensive subsectors such as basic chemicals;
- rising global competition;
- increasing market segmentation: as a response to the global competitive pressures firms focus on market niches that provide higher value-added activities;
- rising income per capita;
- an ageing society, leading to a shrinking labour force and requiring increasing levels of health services and medication.

Emerging skills and competencies

To identify emerging skills and competencies in the chemical sector in recent years, the Commission's report analyses changes in the distribution of job functions.

In 2006, plant and machine operators represented the largest share of employees in both the EU15 (at 21%) and NMS (23%). Other sizeable occupations were engineers, business and other professionals, secretaries and labourers. Service workers and computing professionals formed only a small proportion of total employment. Interestingly, the share of technical executing occupations (metal, machinery, precision to labourers) was much higher in the NMS (55%) than in the EU15 (44%). This may indicate higher production intensity in the NMS, with support and executive functions located in the EU15.

Overall, there have been several major changes in the occupational structure of the sector between 2000 and 2006. Noticeably, the proportion of business professionals and other professionals has declined in the NMS, by 7% and 2% respectively. Over the same period, the percentage of engineers in the sector rose by 3%, computing professionals by 3% and rubber and plastic product machine operators by 5%. This is a clear indication of ongoing restructuring processes in the NMS. In the EU15, changes over the same period were much less pronounced; however, the proportion of machine operators and other professionals did shrink, while that of business professionals, engineers and computing professionals expanded.

Almost all subsectors and occupations show declining trends for less-educated employees. In the EU15, the greatest decline in the percentage of less-educated workers was seen among service workers – their numbers dropping by 14%. Meanwhile, in the NMS, the proportion of less-educated workers shrank most dramatically among chemical and rubber and plastic products machine operators – a fall of 39%. While the decrease among service workers can be explained by outsourcing, the reduced proportion of less-educated workers operating machines and crafts can be explained by a general trend of upskilling in these occupations.

Similarly, in the NMS, the proportion of workers with a medium level of education declined primarily among business professionals (-27%) and engineers (-14%), while in the EU15 the sharpest decline was seen in the numbers of computing professionals (-10%). These are also the occupations with a rising proportion of highly educated workers, which is further evidence of upskilling. Almost all occupations, particularly computing professionals and service workers, experienced an expanding share of highly educated workers. This upskilling trend is most noticeable in the NMS.

Table 1: Employment trends by job function in the chemicals, pharmaceuticals, rubber and plastic products sector – shares (2006) and changes in shares (%), 2000–2006

	Shares, 2006			Changes in shares, 2000–2006		
	EU15	NMS	EU	EU15	NMS	EU
Managers	10	9	10	0	0	0
Computing professionals	2	1	2	1	3	1
Engineers	13	11	13	1	3	1
Business professionals	8	6	7	2	-7	0
Other professionals	11	11	11	-2	-2	-2
Office clerks and secretaries	12	7	11	0	0	0
Service workers	1	2	2	0	0	0
Metal, machinery, precision workers	7	10	8	0	1	0
Craft, trades	4	5	4	0	0	0
Chemical production machine operators	1	3	1	0	1	0
Rubber, plastic production machine operators	2	2	2	-1	5	0
Plant, machine operators	21	23	21	-1	-3	-1
Labourers	9	12	9	1	1	1
Total	100	100	100	1	1	1

Source: *Investing in the Future of Jobs and Skills – Executive summary – Chemicals, Pharmaceuticals, Rubber & Plastic Products, European Commission, 2009; original data from Eurostat Labour Force Survey/TNO*

Scenarios and implications for the future

Based on the combination of endogenous and exogenous drivers of change in the sector, the report distinguishes four possible scenarios for the chemicals, pharmaceuticals, rubber and plastic products sector.

Scenario I: Green and global

'Green and global' describes a world characterised by greater international competition and strong global and European economic growth. An increase in demand for green products coincides with adequate policy support, lead market initiatives and more and smarter innovation by the EU chemical industry, especially in bio-based 'green' chemistry and materials. In the EU, environmental, security and safety regulations become more flexible and targeted. As a result, Europe is able to specialise in global niches, with even more energy-efficient processes driven by cluster integration.

Scenario II: Green and focus Europe

'Green and focus Europe' presents a vision of the future in which a slowdown of global economic growth coincides with increasing protectionism and trade regionalization; this leads to a situation in which competition and trade more and more takes place within rather than between trade blocs. Slowing growth is predominantly the result of ongoing price spikes pressures in the oil, gas and energy markets, making both international business activity and transport more expensive. Europe sustains its high-quality institutions and establishes a true European single market. High energy prices and disruptions in international supply chains make substitutes more competitive and lead to market-driven adoption of green technologies and innovation. Consumers opt for energy efficient products. A proactive dialogue between government and industry enables a better and smarter tailoring of existing environmental and security and safety regulations. 'Green and Focus Europe' results in a greater and greener variety of products, but a stronger focus on the European home market.

Scenario III: European retreat

An overall slowdown in economic growth caused by high energy prices, and reduced global competition characterises the future described in the 'European Retreat' scenario. Steep rises in the prices of oil, gas and energy leads to an increased demand for environmentally friendly and energy-saving products; however, policy support to facilitate this change is minimal, a strong belief in market forces being the dominant doctrine. At the same time, demand for EU-produced traditional chemicals products slows. Together, this represents a dangerous combination for the future competitiveness of the EU chemical industry. Low EU tariff barriers – plus excess global capacity in the Middle East and east Asia – mean that surpluses easily can make their way into European markets, with Europe losing competitiveness, especially in energy intensive, basic chemicals production. Europe does not only face a loss of global leadership in chemicals production, but will possibly witness a gradual retreat of production capacity throughout Europe.

Scenario IV: Global Pressure

The 'Global pressure' scenario combines strong overall economic growth and high incomes with even stronger global competition making 'all hands on deck' for the EU chemicals industry a leading adage. Strong economic growth is engendered by continuing and expanding global trade flows in combination with stable global oil and energy prices. Globalisation, however, also stimulates further international competition in chemicals from the Middle East, east Asia, and Russia. Europe's competitors are able to produce high-quality chemical goods at lower prices. Stable – but less tailored regulation – without any renewing and innovating policy initiatives, combined with institutional stagnation (no further deepening of the internal market), will add to the increased competitive pressures internationally. Excess global capacity and low EU tariff barriers mean that surpluses make their way into European markets. This results in a further squeeze of EU market shares and profit rates, with European producers gradually losing global leadership.

Consequences for competencies and occupations

For all job functions, the report identified future skill needs based on six clusters of similar and related skills. Across all job functions, 'soft' skills will become increasingly important in the coming years. The general trend of upskilling is bound to continue. Due to the changing nature of jobs, technical knowledge will become somewhat less important while the ability to adapt and learn new skills will be essential.

Key emerging skills and knowledge needs can be outlined for each job function.

Managers require the broadest skill set. In particular, social skills are needed to manage workers in a less hierarchical and more networked company environment. The anticipated transformation of the sector makes change-management skills and business-development skills essential.

IT professionals focus on specific IT solutions, with modelling and simulation in production and research becoming increasingly important. Programme developers require a hybrid background of chemistry and software engineering, while users need to learn how to apply the new technologies effectively in their work.

Engineers New technological developments and the drive for sustainability make cross-disciplinary education and thinking crucial. With globally distributed production processes and research and development (R&D) and innovation becoming more dispersed between academic, industry and research actors, managing networks becomes a key task for engineers. Increasing regulation and HSE standards also mean that other sectors and authorities are in demand for chemically educated engineers.

Accounting and finance With widespread IT systems for accounting and financial services, IT skills are of crucial importance in the future. Furthermore, with firms' increasingly global orientation, adapting to international and foreign accounting standards and financial regulations become more important.

Sales and marketing Beyond the increasing importance of soft skills required in most professional jobs, entrepreneurial skills and spotting market trends and opportunities become increasingly important.

Supply chain management is a relatively new function based on the potential strategic advantages of the integration of purchasing, sales and logistics across a global span. It is an emerging competency that requires strong practical experience, quantitative and IT skills and trade and regulatory knowledge.

Support staff require up-to-date IT skills to function effectively in an administrative environment. In addition, team working and communication skills, self-organisation and multitasking are key emerging skills. Drivers, a subcategory of support staff, are important for supply chain efficiency. Language and regulatory differences between Member States make it difficult to find drivers who have the appropriate background to transport hazardous goods.

Production workers mostly require technical knowledge for operating production equipment. In addition, flexibility of operations requires that workers increasingly be multiskilled, to enable them to work in different production tasks (depending on plant demand).

Plant and machinery maintenance and repair workers mostly require technical knowledge to repair and maintain plants and machinery. These include metal-related crafts skills as well as – increasingly – skills related to electronic devices.

Labourers still make up a considerable part of the workforce, although this group has seen the biggest drop in terms of employment. Labourers without technical qualifications need to be upskilled if they are to be able to participate in the workforce in the long run. Increasingly, the tasks of other less-educated workers, such as cleaning and maintenance, are being outsourced, and so moving to the services sector.

Strategic choices and recommendations

Strategic choices to meet future skills needs must be taken by a number of actors at different levels (at the firm level and at local, regional, national and sectoral level). For obvious reasons, firms are an important player in finding solutions for skills needs, whether in terms of volume – skills shortages – or in matching any existing skills gaps. Companies can avail of a number of options to meet their skills needs:

- recruiting workers from other sectors;
- recruiting workers from other Member States;
- recruiting workers from third countries;
- recruiting unemployed workers with or without re-training;
- recruiting young people coming from the education system, with or without retraining (first job recruits);
- training employed workers;
- changing the work organisation (including network collaboration and mergers);
- outsourcing and offshoring.

Sectoral organisations, educational institutions and governments also have a role to play. They will be the prime actors in addressing the following options:

- changing general and vocational education;
- designing and offering new courses (continuing vocational education and training);
- providing information about jobs and (emerging) skills; career guidance; updating job profiles regularly;
- improving the image of the sector (in joint action with companies);
- cooperating better with industry (through internships, company visits for participants in education and assisting in improving the sector's image, for example).

Whether these strategic options are feasible and viable depends on a number of factors. In order to discuss and select from the available list of strategic options, one should first know whether and when skills needs are likely to arise, both in quantitative terms (the number of job functions) and in qualitative terms (the emerging knowledge and skills).

An important question that needs to be addressed first is at what level and to whom the skills needs question actually applies. Obviously, for an individual firm, different information is needed when identifying future skills needs than for a government ministry at national level. The identification of possible strategic choices in principle requires an extensive and detailed analysis at the national level (preferably the regional level) of skills demand and supply patterns for each subsector.

The Commission's report draws a set of recommendations for actions to meet future skills needs.

- **Intensify cooperation** between all relevant stakeholders in the sector, and especially between industry, education and policy-makers. The challenge to overcome skill gaps and shortages will only be met if industry, research institutions, training providers, social partners and public authorities act together, both at the national and the European level.
- **Invest in human capital** This is required if skills needs are to be met. Cost-sharing mechanisms between public authorities, companies and individuals need to be developed and lifelong learning promoted; learning must be made more attractive to all – for instance, through tax incentives and a change of attitudes towards learning.
- **Create a diverse workforce** The EU chemicals industry shows a striking lack of diversity in its workforce compared with other sectors. Diversification can be stimulated by positive action in favour of underrepresented groups, such as women. This should go hand-in-hand with other measures, such as more flexible working time arrangements.
- **Improve the image of the sector** This needs to be targeted mainly at young people; however, it can also be done for workers from other sectors, by focusing on sustainability and environmental issues.
- **Bring science into the school curriculum** This should be done as early as possible. Science can be made more engaging by, for example, incorporating compelling topics such as climate change and pollution into academic study.
- **Standardise regulations** Basic health, environmental and safety regulations differ between the Member States; standardising these could assist worker mobility.
- **Support university education in SCM** With a growing need for personnel skilled in supply chain management (SCM), the further development of this discipline at university level is recommended.
- **Foster interdisciplinary and multidisciplinary studies** While a sound chemical education is essential for developing the required skills, attention should also be given to other competencies, such as project management, languages and business development.
- **Standardise national vocational qualifications** The chemicals industry is in need of many soft skills, such as communication skills, project management skills and IT skills. These are often not certified in diplomas or regular education programmes. This lack of skills transparency limits the mobility of the workforce and hinders the matching of skill demand and supply.

Non-metallic materials 3

The importance of the sector in Latvia

A 2009 report submitted to the European Commission looking at future skills and knowledge needs in the non-metallic materials sector defines the sector as covering a mixture of industries involved in the processing of natural resources (e.g. silica sand, clay, natural stone and rock) into marketable products. Two main subsectors are distinguished: glass and ceramics, and construction materials (European Commission, 2009c).

Figures for Latvia in the report for 2006 show that employment in the non-metallic materials sector amounted for between 0.5% and 0.8% of total employment in the economy. Although the number of people employed by the industry is still small, it is growing rapidly. During the period 2000–2006, employment in the sector grew at a rate of over 5% annually – one of the highest rates in Europe.

The report does not present data on the output of the sector in Latvia; however, according to figures provided by the Latvian Statistical Office, in 2006 the gross value-added of the non-metallic industry (NACE 26) was around 0.7% of the total output of the economy,

These data suggests that the importance of the sector (in terms of value-added) for the Latvian economy is similar to the EU average (0.8% in 2006).

Europe-wide trends for output and employment

The value-added of the non-metallic sector in the EU in 2006 amounted to €87 billion, of which €80 billion euro was produced in the EU15. During the period 1995–2006, in the NMS the sector grew faster than the overall economy (a growth rate of 4.5% as against 3.2%). In absolute terms however, the value-added generated by the non-metallic sector in the NMS was, in 2006, still less than 10% of the value-added generated in the EU15.

The glass industry accounted for 22% of the total value-added generated in the sector, ceramics for 21%, cement, lime, concrete, plaster (and their products) for 43% and ornamental and building stone for another 15%.

Despite the relatively small size of the sector in terms of value added, its importance should not be underestimated both for trade and for a number of other sectors and areas – the construction industry, aerospace, automotive and transport, the electrical and electronics industries (in terms of glass fibre and special glass for tubes and bulbs), households (in terms of glass and ceramics, including decorative and handicraft products).

In recent years, trade in the non-metallic sector jumped in the NMS, with imports growing at a rate of 10.9% annually and exports at 8.8%.

Altogether, the non-metallic sector employed 1.62 million people in 2004 in EU, or 0.74% of the overall EU employment. Over the period 2000–2006, employment in construction materials grew at a rate of 0.1% annually in the EU as a whole, but declined by 0.3% annually in the NMS. In glass and ceramics, negative growth was registered in both the EU as a whole and the NMS (falling by 2.1% and 1.1% per year, respectively).

Drivers of change

In total, 26 drivers of change covering demographic, economic, social, technological, environmental and political factors were assessed in order to construct scenarios of likely future developments in the sector. The most important drivers are listed here;

- global competition;
- availability and price of oil and energy – both the construction materials and the glass and ceramics subsectors are characterised as energy-intensive industries;
- availability and price of raw materials – building materials and glass and ceramics subsectors are heavy users of a wide range of raw materials;
- R&D and innovation – creating products and opening up new markets are important, and hence is R&D and innovation;
- income per capita – slower growth of income per capita due to less global competition and a stalling global economy as against faster growth of income per capita driven by an expanding global economy;
- environmental regulation – including reductions in energy use and classification of substances at European level, such as REACH;
- health, safety and security regulations – these apply both to employees' working conditions (in terms of handling hazardous substances and heavy materials) and to consumers (as regards substances that can harm health);
- intellectual property rights protection – counterfeiting in glass and ceramics products, for example, is a growing problem.

Emerging skills and competencies

The non-metallic materials sector is a stable, conservative sector in terms of skills mix. Most jobs are in the categories of extraction and building workers, plant operators, potters (and glass workers), and labourers (see Table 1). The NMS have considerably more potters and metal workers than the EU15, whereas the EU15 have relatively more office clerks and secretaries as well as extraction and building workers.

The proportion of women employed in non-metallic materials (28%) is low compared with other sectors. Almost half of the employees in the sector are below 40 years of age.

Employment is dominated by employees with a medium level of education; this is true for the EU15 (45%) and especially for the NMS (81%). Less-educated workers constitute 37% of all employees in the sector in the EU15 and 6% in the NMS; these proportions have declined over the last seven years.

The greatest changes during the period 2000–2006 were observed among the following occupations. The employment of extraction and building workers rose by three percentage points; for plant operators in glass and ceramics, and for mobile plant operators, it rose by two percentage points; for engineers, one percentage point. Employment of labourers fell by three percentage points. Changes were more pronounced in the NMS. The shift in a skills structure reflects the growing capital intensity of the sector – the substitution of capital for

labour. Blue-collar workers are gradually being replaced by employees with a medium level of education. Interestingly, this change has so far occurred most markedly in countries where the sector gained comparative advantage.

Table 2: Employment trends by job function in the non-metallic materials sector – shares (2006) and changes in shares (%), 2000–2006

	Shares, 2006			Changes in shares, 2000–2006		
	EU15	NMS	EU	EU15	NMS	EU
Managers	7	6	7	0	1	0
Computing professionals	1	1	1	0	0	0
Engineers	6	5	6	1	1	1
Business professionals	3	3	3	0	1	0
Other professionals	5	5	5	1	-5	0
Office clerks and secretaries	9	5	8	0	-3	0
Service workers	1	1	1	-1	-1	-1
Extraction and building workers	14	12	14	2	4	3
Metal workers	6	9	7	-1	1	0
Potters, glass making	9	15	10	-2	2	-1
Other craft trades workers	1	1	1	-1	-1	-1
Glass, ceramics plant operators	10	10	10	1	2	2
Metal, mineral plant operators	4	5	4	-2	0	-1
Drivers, mobile plant operators	9	8	9	1	2	2
Other plant machine operators	6	5	6	0	2	0
Labourers	9	10	9	-1	-8	-3

Source: *European Commission, 2009d.*
Original data: *Eurostat Labour Force Survey / TNO*

Scenarios and implications for the future

Four future scenarios were constructed and explored in the report on the European non-metallic materials sector. In constructing these scenarios, different assumptions regarding the direction of change of the drivers mentioned above were made.

The scenarios apply both to construction materials and to glass and ceramics. This does not imply that future developments in both subsectors are to be taken as one and the same, nor that development paths between Member States need be similar. The sectors will face different dynamics in terms of market structure and developments, while they are driven by similar but differently impacting drivers.

Note that demographics developments and their effects on labour supply have not explicitly been identified in selecting the drivers: demographics – in the time frame of 2009–2020 – are relatively certain (i.e. predictable) and play the same role across all scenarios.

Scenario I: Status quo

The 'Status quo' scenario depicts a world characterised by global protectionist tendencies resulting in slow economic growth and easing competitive pressures; this is coupled with little progress in European harmonisation or in setting new environmental, security and safety regulations. The EU non-metallic materials sector benefits from relatively low global competitive pressures, but also suffers from sluggish demand for European products and a lack of innovation. This results in a declining global position for the sector in the longer term, with protectionism meaning that while the sector remains in Europe, its base further declines.

Scenario II: Conservation

In the 'Conservation' scenario, the world is characterised by global protectionist tendencies leading to slow economic growth and easing competitive pressures from outside the EU. This is coupled with European harmonisation and setting of new environmental, health, safety and security regulations. This means that Europe can sustain its competitive advantage of a high-quality institutional environment, based on the conservation of resources at the European level. The easing competitive pressures reduce incentives for firms to seek new market segments or to invest in R&D and innovation, thus reducing the pace of restructuring. The drive towards conservation may be counteracted by lower economic growth; this could reduce the incentives for resource conservation, unless this dynamic is offset by environmental regulation.

Scenario III: Innovation-led growth

The scenario 'Innovation-led growth' depicts a world characterised by further integration of markets leading to fast economic growth and global competitive pressures, coupled with European harmonisation of new environmental and security and safety regulations that shape the sector. This means that Europe manages to exploit the benefits of globalisation – sourcing raw materials and accessing production processes efficiently – while setting advanced environmental and safety standards. These provide strong incentives to the industry to sustain its global innovative edge, by developing new products for a range of different markets, introducing new technologies in production (including further automation) and making improvements in recycling.

Scenario IV: Resource depletion

'Resource depletion' envisages a world dominated by rapid economic growth and international competition as a result of increasing globalisation. This is coupled with a lack of new European or global regulations and standards regarding climate change and environmental protection. This leads initially to a rapid growth based on income growth in Europe and relatively low prices; these however, do not incorporate environmental externalities. This growth pattern is resource intensive, with the cheapest materials being sourced internationally, as well as some high-value, scarcer resources such as magnesia, bauxite and graphite. Prices will rapidly increase for those scarce materials, resulting in reduced demand. It should be noted that 'Resource depletion' was deemed the least likely scenario. However, for reasons of comparison – as a 'gloomy' future perspective - the scenario has been kept in.

Consequences for competences and occupations

All scenarios lead to substantial change in the structure of employment and skills requirements, with the overall job volume change in both the 'Status quo' and 'Resource depletion' being negative, roughly stable in 'Conservation' and positive in 'Innovation-led Growth' (see Table 2).

Table 3: Implications of scenarios for non-metallic materials: job volume changes by function, 2009–2020

	Status quo	Conservation	Innovation-driven growth	Resource depletion
Managers	-	0	+	0
IT professionals	0	0	+	-
Engineers and R&D	-	+	++	-
Accounting and finance	-	-	+	-
Sales and marketing	0	0	+	0
Other professionals	0/+	+	+	0
Administrative support staff	-	-	0	-
Plant and machinery maintenance and repair	-	+	0	-
Truck drivers	0	-	+	-
Skilled production drivers	0	+/-	+/-	-
Labourers	-	-	-	-
Overall job change	-	+/-	+	-

Source: *European Commission, 2009d. Orginal data from TNO-SEOR-ZSI.*
Note: *- means decrease, + means decrease, 0 means no change/maintain*

The general trend of upskilling across job functions is bound to continue in the coming years. Across all job functions, soft skills will become increasingly important. Emerging competencies of higher-skilled jobs mostly refer to *how* to learn, communicate, interact and adapt to changing environments. Emerging competencies in medium-educated job functions, which largely execute defined tasks and processes, refer mostly to specific knowledge sets that can be taught through learning.

More extensive and detailed accounts on skills and knowledge needs, with further differentiations made by scenario, can be found in the European Commission's report.

Strategic choices and recommendations

In addressing future skills and knowledge needs, appropriate and timely joint action is needed by stakeholders in industry (firms, sector organisations and social partners), by training and education institutes, intermediary organisations and by government (at EU level, national, regional and local). Targeted and reliable monitoring

to enable balanced decision-making is vital. Adapting and modernising vocational education and training (VET) systems should be done through increased flexibility, modularisation of training, e-learning and blended learning, stimulating in-company training and lifelong learning. Actions need to be taken proactively, and financially supported, especially for SMEs – for instance in building joint training networks and special training offers (for staff and managers). The training demands of migrant entrepreneurs should be better addressed. Better career guidance is needed; also required is the international and intersectoral acknowledgement of certificates, if cross-sectoral and transnational mobility is to be fostered. The skills that are most in demand are IT skills, intercultural competencies, language abilities, creativity, health and safety skills, and 'green' skills.

Other recommendations include the establishment of partnerships for innovation and job creation and social dialogue. In addition, the report recommends implementing the 10 actions foreseen in the Raw Materials Initiative, improving energy efficiency and boosting environmental performance. Last but not least, it is essential to improve the image of the sector, to diversify the work force and attract sufficiently young staff to counteract the effects of an ageing workforce.

Computer, electronic and optical products 4

The importance of the sector in Latvia

The computer, electronic and optical products sector comprises three main subsectors – office equipment and computers (NACE 30), audio, video and telecommunications equipment (NACE 32) and medical, optical and precision instruments (NACE 33).

Data provided for Latvia, for 2006, in the Commission report on the sector show that employment in the sector amounted to less than 0.7% of total employment in the economy, which is below the EU average (European Commission, 2008a). However, the employment in this sector was increasing rapidly during the last years, especially in medical and precision instruments manufacturing (+6.3% annually, average from the years 1999-2005)

The report does not present figures on the output of the sector in Latvia, but data provided by the Latvian Statistical Office suggest that in 2006 the gross value-added of the computer, electronic and optical products sector (NACE 30, NACE 32, and NACE 33) was relatively insignificant – around 0.08% of the total output of the economy.

Europe-wide trends for output and employment

The value-added of the computer, electronic and optical products sector amounted to €154 billion in the EU in 2006, of which €147 billion was generated in the EU15. During the period 1995–2006, value-added grew by 6.1% annually, almost three times as fast as the whole EU economy. The sector expanded even faster in the NMS – by 10% annually.

Office equipment and computers accounted for €14 billion of the total sector's value-added, with an annual growth rate of -5% over the period 2000–2006; audio, video and telecommunications accounted for €71.8 billion, with an annual growth rate of 3.2% over the same period; and medical, optical and precision equipment accounted for €68.5 billion, with a growth rate of 6.6%.

Trade amounted to €478.8 billion in exports and €595.8 billion in imports. In the EU as a whole, imports grew faster than exports over the period 1995–2006 (an annual growth rate of 11.4% as against 10.5%); however, in the NMS, annual growth in exports outpaced that in imports (22.6% as against 16.2%).

Altogether the sector accounted for about 134,000 enterprises, employing 2.06 million people – 5.98% of EU manufacturing employment and 0.94% of overall EU employment. More than half the jobs were in medical, optical and other precision instruments, and another 40% in audio, video and telecommunications equipment manufacturing. The remaining 17% were in office equipment and computer manufacturing, a sector that also faced the biggest decrease in the number of jobs (an annual fall of 7.3% over the period 2000–2006). In 2006, more than half of the employees in the sector were younger than 40 years. The proportion of women in overall employment (36%) is comparable with other sectors in the economy.

Drivers of change

The main factors that are likely to influence the development of the computer, electronic and optical products sector in Europe and their characteristics are summarised in Table 3.

Table 4: Main drivers of change in the electronic, computer and optical products sector

	Driver	How relevant is this driver for the sector? Scale: 0–10	How uncertain is this driver for the sector? Scale: 0–10	Are substantial impacts expected on the levels of employment?	Are substantial impacts expected on employment composition?	Are substantial impacts expected on new skills?	Short medium or long-term impact?*			Are substantial differences expected between (groups of countries?	Are substantial differences expected between subsectors?
							Short	Medium	Long		
Demographic	Ageing – adapt to the market demands of older, more diversified society	8	1	No	No	No		x	x	No	Yes
Economic	Income per capita and household	9	2	No	Yes	Yes		x	x	Yes	Yes
Globalisation	Outsourcing and offshoring	9	1	Yes	Yes	Yes	x	x	x	Yes	No
	Increasing global competition	9	1	-	-	-	x	x	x	No	No
	Emerging economies driving global growth (new market demand, especially BRICs)	8	3	No	No	No	x	x	x	No	No
	Global/regional production networks (dispersed production locations, transport)	8	2	No	No	No	x	x	x	No	No
	Counter-trend regionalism/ protectionism	6	6	Yes	Yes	No	x	x	x	Yes	Yes
Cultural values	Increasing market segmentation (tailor-made production, mass customisation)	9	2	No	Yes	Yes	x	x	x	Yes	Yes
	Lifestyle changes	8	2	No	Yes	Yes	x	x	x	Yes	Yes
Technology and innovation	Advances in IT impacting on organisational structures & new business models	8	1	Yes	-	-	x	x	x	No	No
	Internet changing production and consumption patterns (e-business etc)	8	3	No	Yes	Yes		x	x	Yes	Yes
	Environmental regulation including energy efficiency	6	4	No	No	No	x	x	x	No	No

Notes: * *Short term = 0–3 years; medium term = 3–7 years; long term = > 7 years. All three categories may apply*
Source: *European Commission, 2009e.*

Emerging skills and competencies

The computer, electronic and optical products sector is a fast-changing, dynamic and competitive industry, one that is intensive in terms of R&D. These factors influence both the occupational structure and the skills mix of the sector. In 2006, most jobs in the sector belonged to these categories: engineers, assemblers, business and

other professionals (i.e. accounting & finance, sales & marketing, supply chain management), computer professionals, office clerks and managers. The NMS had considerably more assemblers, machinery workers and mechanics than the EU15, whereas the EU15 had more engineers, professionals and office clerks.

The sector is dominated by medium-educated employees; this is true for the EU15 (47% in 2006), and especially for the NMS (71%). The share of less-educated workers has decreased by five percentage points in both the EU15 and NMS over the last seven years and is now 17% and 9%, respectively.

Table 5: Employment trends by job function in the computer , electronic, and optical products sector – shares (2006) and changes in shares (%), 2000–2006

	Shares, 2006			Changes in shares, 2000–2006		
	EU15	NMS	EU	EU15	NMS	EU
Managers	10	5	9	1	0	1
Computing professionals	8	6	8	2	3	2
Engineers	21	13	19	3	4	2
Business professionals	5	3	4	0	2	0
Other professionals	11	9	10	3	-5	2
Office clerks and secretaries	9	6	9	-2	-2	-2
Service workers	1	1	1	0	0	0
Metal, machinery workers, blacksmiths	4	7	5	-1	0	0
Electrical equipment mechanics, fitters	7	10	7	-1	-2	-1
Precision, handicraft, craft printing	6	4	6	0	-1	0
Other craft, trades workers	2	2	2	0	0	0
Assemblers	8	23	11	-5	5	-2
Other plant and machine operators	5	8	5	1	1	1
Labourers	4	3	4	0	-5	-1

Source: *European Commission, 2009e;*
Eurostat Labour Force Survey/TNO [original data]

Most changes during the period 2000–2006 are evident among computing professionals, other professionals and engineers (all up by two percentage points) and office clerks and assemblers (down by two percentage points.). Changes in the NMS are more pronounced. For instance, other professionals and labourers are both down by five percentage points, engineers are up by four percentage points, assemblers are up by five percentage points, and computing professionals are up by three percentage points. The shift in skills structure reflects an apparent shift in specialisation across Europe, with central and eastern Europe specialising in

production and assembly activities, and western Europe concentrating on the R&D-intensive, higher value segments.

Scenarios and implications for the future

Four scenarios for the future development of the electronic, computer and optical equipment sector in Europe by 2020 were presented in the Commission report.

Scenario I: High-end Customer Hi-Wi-Fi

'High-End Customer Hi-Wi-Fi' depicts a world characterised by openness, willingness to experiment and looking for creative solutions for everyday problems (in terms of work, leisure, and quality of life). Industry creates sustainable high-end niches and is able to market its products both domestically and abroad in a context of continuing and strong international competition. With a focused EU policy of innovation and similarly focused national policies, a viable environment is created for regaining ground in innovation and market leadership for EU-based firms. Different lifestyles and a strong demand for individualised products are met by mass customisation and individualisation. There is strong progress in recycling materials and increasing energy efficiency. European firms are leaders in organising and orchestrating flexible international value networks. Most standardised production is offshored, but European companies increasingly move parts of production back to Europe – specifically, the NMS – to serve high-end niche segments of their market, closer to customers, with better quality assurance and so creating logistics savings.

Scenario II: Hi-Wi-Fi for Everyone

'Hi-Wi-Fi for Everyone' depicts a world characterised by a social and cultural climate that is conducive to change, with appropriate innovation policies stimulating high-tech innovations. However, European income growth is low, and European consumer demand is less individualised than elsewhere (US, Asia). The most important high-value niche opportunities for firms in the sector lie outside Europe. Product developments for specific groups, e.g. the elderly, halt in Europe because of fragmented markets and the dominance of national regulation; the single European market for services does not materialise. Europe specialises only in a few niche markets, such as medical equipment. Offshoring continues and assembling presently located in the NMS will move out of Europe, with only a few niche products for the export market remaining. Differentiation allows European firms to compete, being the leading coordinators of international value and production networks.

Scenario III: Footloose and Offshored

'Footloose and Offshored' depicts a world characterised by strong income growth and a demand for more customised and personalised products. However, European society becomes more inward looking; fragmented (national) innovation policies do not have sufficient weight to impact much upon innovation. European firms are outcompeted in meeting demand for individualised products (including age-specific ones), which come increasingly from outside Europe. Consumers pick and choose from whatever is available, world-wide, facilitated by the Internet. Assembling will move almost completely out of Europe; this also holds for specialised and tailor-made assembling. European firms will remain leaders in global value networks, but with hardly any production locations in Europe. Following the Benetton model, headquarters, public relations (PR) and marketing functions are still in Europe but most of the other vital company functions are performed elsewhere. R&D is gradually moving out of Europe.

Scenario IV: Fading Away

'Fading Away' depicts a world dominated by low income growth, and although Europe is still a sizeable market, demand for innovative and individualised high-value products and services lags. User industries tend to go where the markets are, with Europe losing ground. European society is inward-looking with protectionist tendencies strong. Innovation policy is mainly national and fragmented. European firms show a lack of initiative and capacity for developing new high-tech products for the exports market. Most production will be offshored. Only the development and production of very specialised niche products will remain in Europe. Europe faces the risk of a brain drain of people working in the sector to other sectors, as well as to the industry outside Europe.

Consequences for competencies and occupations

All scenarios point to a substantial change in the structure of employment and skills requirements. In determining job volume changes, a distinction was drawn in the report between electronic components, computers, communication equipment and consumer electronics on one side, and optical, medical and precision equipment on the other. Predicted future changes in job volumes under various scenarios are summarised in the table below.

Table 6: Implications of scenarios – job volume changes by function, 2009–2020 – subsector: electronic components, computers, communication equipment and consumer electronics

	High-end customer hi-wi-fi	Hi-wi-fi for everyone	Footloose and offshored	Fading away
Managers	+	0	0/+	0/-
IT system developers	+	0/+	0	-
IT system appliers and supporters	0	0	0	-
Production engineers	0	0	-	-
R&D engineers	+	0/+	-	-
Accounting and finance	0/+	0	0	-
Sales and marketing	+	0	0/+	-
Supply chain managers	+	0/+	0/+	0/-
Support staff	-	-	-	-
Metal and machinery workers	0	-	-	-
Electric/electronic equipment mechanics and fitters	-	-	-	-
Precision workers and repairers	0	0	-	-
Assemblers	0/+	-	-	-
Labourers and operators	-	-	-	-
Overall job change	+	0	0/-	-

Source: *European Commission, 2009e*. Orginal data from TNO-SEOR-ZSI.
Note: *- means decrease, + means decrease, 0 means no change/maintain*

Table 7: Implications of scenarios – job volume changes by function, 2009–2020 – subsector: medical, optical and measurement devices

	High-end customer hi-wi-fi	Hi-wi-fi for everyone	Footloose and offshored	Fading away
Managers	+	0/+	0/+	0/-
IT system developers	+	+	0	-
IT system appliers and supporters	0	0	0	-
Production engineers	+	0	-	-
R&D engineers	+	+	-	-
Accounting and finance	0/+	0	0	-
Sales and marketing	+	0	0/+	-
Supply chain managers	+	0/+	0/+	0/-
Support staff	-	-	-	-
Metal and machinery workers	0/+	0/+	-	-
Electric/electronic equipment mechanics and fitters	-	-	-	-
Precision workers and repairers	+	+	-	-
Assemblers	+	0	-	-
Labourers and operators	-	-	-	-
Overall job change	+	0/+	0/-	-

Source: *European Commission, 2009e*. Orginal data from TNO-SEOR-ZSI.
Note: *- means decrease, + means decrease, 0 means no change/maintain*

The report illustrates the key emerging skills and knowledge needs for the three largest of the eleven job functions: engineers, precision workers and repairers.

Engineers (production and R&D)

In scenarios characterised by fast change and dynamic markets, the move towards sustainable market niches and market segmentation is a key factor influencing the skills and knowledge requirements of engineers. R&D engineers are vital, as R&D forms the basis for growth in the sector in Europe and elsewhere. Production engineers are key in the production of high-tech products and in the optical, medical and precision products sector. Both require not only technical but also organisational and social skills. Social skills (especially team working, communication and networking), problem-solving skills (analytical ability, interdisciplinary thinking, initiative, multiskilling and creativity) and self-management skills (planning, flexibility, stress management and time management) are important for both production and R&D engineers. R&D engineers need to focus on the design of new products and services; in addition, they should have a broad perspective on potential market needs and should be able to integrate different solutions into one product. Keeping up-to-date in terms of technical knowledge and knowledge of product development and system architecture is key for R&D engineers; however, business understanding and customer understanding is crucial as well. Innovation is organised around interdisciplinary expert teams and is project based and collaborative; it also incorporates

external experts either from universities or other firms. This requires increased project management skills, especially from R&D engineers. As surveyors of the production process, process optimising and quality management skills will be important for production engineers.

Precision workers and repairers

This category includes precision workers in metal and other materials, precision-instrument makers, and precision repairers mainly active in maintenance and repair. The most important competence for these workers is technical knowledge. Keeping this knowledge up-to-date and acquiring new knowledge is vital. Product knowledge is crucial, as are quality control skills and knowledge of regulation that affects products and production. Problem-solving skills including analytical and interdisciplinary skills, initiative and multiskilling, as well as self-management (flexibility) will be key in the future. However, the changes in work organisation increasingly require social skills related to team working and communication.

Strategic choices and recommendations

The conclusions and recommendations made refer to two levels: the individual job function, focusing on available options by job function; and the generic level, focusing on sectoral stakeholders (firms, social partners, education and training institutes and others) and policymakers.

The main strategic choices at the individual level are summarised in Table 8.

Table 8: Summary of changes in job volumes, skill changes, main strategic choices and main players in anticipatory action by scenario

		Hi-Wi-Fi for Everyone	Hi-Wi-Fi Exported	Hi-Wi-Fi for Everyone	Hi-Wi-Fi Exported	
Managers	1. Employment volume change	+, +*	0, 0/+	+, +	0/+, +	R&D engineers
	2. Skills changes counted	18		20		
	3. Emerging skills needs	Entrepreneurship, Strategic& visionary skills, Change management, Self management, Social skills (communication, networking, language, intercultural skills), Knowledge (e-skills, supply chain management, Intellectual Property Management		Knowledge (technical, product development, system integration), Problem solving skills, Self management (planning, stress & time management, flexibility), Social skills (team working, communication, networking), Entrepreneurship (especially understanding customers and suppliers), Project management, Process optimising, Trendsetting and spotting skills, Strategic and visionary skills		
	4. Most important solutions	Recruiting, Training and re-training, Designing & offering new courses, Providing information, Stronger cooperation between stakeholders		Recruiting from other sectors, other Member States, non Member States and unemployed, Training and retraining, Changing work organisation, Outsourcing and offshoring, Changing vocational education, Designing and offering new courses, Providing information, Improving image, Stronger cooperation between stakeholders		
	5. Most important actors	C, G, E, U		C, E, G, I S, U		

		Hi-Wi-Fi for Everyone	Hi-Wi-Fi Exported	Hi-Wi-Fi for Everyone	Hi-Wi-Fi Exported	
IT system developers	1. Employment volume change	+, +	0, 0/+	0/+	0, 0	Accounting and Finance
	2. Skills changes counted	15		10		
	3. Emerging skills needs	Knowledge (Imaging, System integration, Modelling & simulation, Programmes Languages), Problem solving skills (analytical skills, multi-skilling)		Knowledge (legislative and regulatory, e-skills), Analytical skills, Self Management (stress & time management, flexibility, multitasking), Social skills (team working, language, intercultural skills), Process optimising		
	4. Most important solutions	Recruiting from other Member States, from non Member States and young people, Training and retraining, Changing vocational education, Designing and offering new courses, Providing information, Improving image, Stronger cooperation between stakeholders		Recruiting, Training and retraining, Outsourcing & offshoring		
	5. Most important actors	C, G, E, I, S U		C, E, G, I		
IT systems appliers and developers	1. Employment volume change	0, 0	0/+, +	+, +	0, 0	Sales and marketing
	2. Skills changes counted	13		20		
	3. Emerging skills needs	Problem solving skills (especially analytical skills and multiskilling), Self management (especially stress & time management), Knowledge (especially B2B IT platforms), Social skills (team working, communication)		Entrepreneurship, Client relationship management, Social skills (especially intercultural), Self management, Knowledge (product), Problem solving skills (interdisciplinary, creativity), Project management		
	4. Most important solutions	Recruiting from other sectors, other Member States, non Member States, young people and unemployed, Training and retraining, Outsourcing and offshoring, Changing vocational education, Designing and offering new courses, Providing information, Improving image, Stronger cooperation		Recruiting, Training and retraining, Changing work organisation, Outsourcing and offshoring, Designing and offering new courses,Providing information, Stronger cooperation between stakeholders		
	5. Most important actors	C, G, E, I, S, U		C, E, G, I, U, S		
Production engineers	1. Employment volume change	0/+	0, 0	+, +	0/+, 0/+	Supply chain managers
	2. Skills changes counted	14		10		
	3. Emerging skills needs	Problem solving skills, Self management (planning, stress & time management, flexibility), Knowledge (technical and e-skills), Process optimising, Quality management, Social skills (team working and communication)		Social skills (networking, language, intercultural), Knowledge, Analytical skills, Self management (stress and time management, flexibility)		
	4. Most important solutions	Recruiting from other sectors, other Member States, non Member States, unemployed, Training and retraining, Changing work organisation, Outsourcing and offshoring, Changing vocational education, Designing and offering new courses, Providing information, Improving image, Stronger cooperation between stakeholders		Recruiting, Training and retraining, Changing work organisation, Outsourcing and offshoring, Changing vocational education, Designing and offering new courses, Providing information, Stronger cooperation between stakeholders		
	5. Most important actors	C, E, G, I S, U		C, E, G, I, S, U		

		Hi-Wi-Fi for Everyone	Hi-Wi-Fi Exported	Hi-Wi-Fi for Everyone	Hi-Wi-Fi Exported	
Support staff	1. Employment volume change	-, -	-, -	-, -	-, -	Electrical/ electronic equipment mechanics and fitters
	2. Skills changes counted	9		10		
	3. Emerging skills needs	Self management (especially flexibility and multi-tasking), Initiative, Social skills (team working, communication, language, intercultural), Knowledge (e-skills)		Knowledge (especially technical), Social skills (team working and communication), Problem solving skills (initiative, multi-skilling), Flexibility		
	4. Most important solutions	Recruiting, Training and retraining, Outsourcing and offshoring, Designing and offering new courses		Recruiting, Training and retraining, Outsourcing and offshoring, Designing and offering new courses, Providing information, Improving image, Stronger cooperation between stakeholders		
	5. Most important actors	C, E, I, G		C, E, I, G, S, U		
Metal and machinery workers	1. Employment volume change	0, 0/+	-, 0/+	0, +	0, +	Precision workers and repairers
	2. Skills changes counted	10		11 (precision makers), 13 (precision repairers)		
	3. Emerging skills needs	Knowledge (especially technical and quality control), Social skills (team working and communication), Problem solving skills (initiative, multi-skilling), Flexibility		Knowledge (technical , product, quality control), Problem solving skills (especially analytical), Social skills (team working, communication, language, intercultural), Flexibility)		
	4. Most important solutions	Recruiting, Training and retraining, Outsourcing and offshoring, Designing and offering new courses, Providing information, Improving image, Stronger cooperation between stakeholders		Recruiting, Training and retraining, Outsourcing and offshoring, Changing vocational education, Designing and offering new courses, Providing information, Improving image, Stronger cooperation between stakeholders		
	5. Most important actors	C, E, I, G, U, S		C, E, I, G, S, U		
Assemblers	1. Employment volume change	0/+, +	-, 0	-, -	-, -	Labourers and operators
	2. Skills changes counted	11		5		
	3. Emerging skills needs	Knowledge (technical, product, e-skills), Social skills (team working, communication, language), Problem solving skills (initiative, multi-skilling), Self management (stress & time management, flexibility)		Knowledge (e-skills, technical knowledge, quality control), self management (stress & time management, flexibility		
	4. Most important solutions	Recruiting, Training and retraining, Changing work organisation, Outsourcing and offshoring, Designing and offering new courses, Providing information, Improving image, Stronger cooperation between stakeholders		Recruiting young people from the education system (replacement demand); Training and retraining (up-skillling)		
	5. Most important actors	C, E, I, G, S, U		C, E, I		

Source: *European Commission, 2009e*

C=Companies; S=Sectoral organisations, U=trade Unions; E=Education and training institutes; G=Government (EU, Member State, regional, local). Notes: 1) The term 'skills' includes knowledge (needs). 2) 'Skills changes counted' refers to the number of skills categories in the most extreme scenario. Assessment of volume changes for electronic components, computers, communication equipment and consumer electronics on the one hand and for the optical and medical products on the other hand.

On a more general level, the report puts forward a number of other recommendations.

- Adapt and modernise vocational education and training (VET) and general education systems, but do this nationally rather than at the EU level; enhance flexibility in education and training by promoting modularisation as well as in learning forms – e.g. by e-learning and blended learning;
- Strengthen collaboration between vocational training institutes and industry and knowledge networks in higher education.
- Build on existing knowledge transfer and establish learning networks alongside the value chain.
- Strengthen basic skills early in the schooling process and improve the quality of primary education.
- Promote the natural sciences and mathematics in schools and improve the image and visibility of technical and scientific job careers.
- Set up special courses dedicated to sector characteristics: supply change management, design engineering, nano-electronics and nano-optics.
- Provide special courses for older workers.
- Pay more attention to interdisciplinary and multidisciplinary studies; foster multi-skilling.
- Foster collaboration between all relevant stakeholders (create partnerships for innovation and job creation, and for social dialogue).
- Increase intra- and intersectoral mobility and transnational mobility; promote the international and intersectoral acknowledgement of certificates.
- Promote the intrasectoral, intersectoral and transnational acknowledgement of IT skills by introducing an IT driver's license;
- Provide better career guidance for those in search of a job, supported by skills assessment schemes.

Transport and logistics 5

The importance of the sector in Latvia

In the Commission report on the sector, the transport sector is defined as the NACE sectors 60 (land transport and transport via pipelines), 61 (water transport), 62 (air transport) and 63 (supporting and auxiliary transport activities and activities of travel agencies) (European Commission, 2009f).

Figures provided in the report for Latvia for 2006 show that employment in land transport amounted to between 4% and 7.4% of total employment in the economy, whereas in water and air transport it was less than 0.1% in each. Supporting and auxiliary transport activities (excluding activities of travel agencies) employed between 1.4% and 2.5% of the total.

The report does not present data on the output of the sector in Latvia but figures provided by the Latvian Statistical Office suggest that in 2006 the gross value added of the transport industry was around 8.1% of the total output of the economy, with land transport (NACE 60) contributing 4.4% and supporting and auxiliary transport activities including travel agencies (NACE 63) contributing 3.7%. No data is given for water and air transport but, looking at the employment data, these subsectors seem relatively unimportant to the Latvian economy. These data suggest that transport is more important in terms of output for the Latvian economy than on average in the EU. The report states that in 2006, transport in the EU25 generated €530.2 billion of value-added, which amounts to about 4.6% of EU GDP.

Europe-wide trends for output and employment

Over a 10-year period, the annual growth rate in added value of the transport sector has been 4.3%, which is almost double the annual growth of the whole European economy. The strongest expansion occurred in support activities with an average annual growth rate of 6.7% over the period 1995–2006. Growth was also registered in other subsectors: water transport activities (+5.3%), land transport (+3.2%) and air transport (+1.5%).

There were however some significant differences between the EU15 and NMS: while support activities and water transport grew strongly in the EU15, the NMS registered a slight decline (of -1% and -5.2% respectively). On the other hand, the value-added of air transport grew slowly in the EU15, whereas in the NMS its average growth rate amounted to 12.6% annually.

Transport, particularly the road transport subsector, is an important employer in Europe. In 2006, the sector employed some 9.62 million persons. With 5.84 million workers, land transport was the most important in terms of employment. However, its annual growth rate of 0.6% over 10 years was below the rate for the whole sector (2%). The fastest employment growth, both in the EU15 and the NMS was recorded in support activities (5.7% and 6.8% respectively). Interestingly, employment in air transport in the NMS was strongly reduced (-9.9% per year), while in the EU15 it grew by around 0.4% a year.

Labour Force Survey data show that only 21.1% of the persons employed in the sector in 2005 were women. In road transport, the female share of the workforce was only 13.9%. The age profile of the transport sector is also an issue for concern, with 17.5% of the workforce aged between 15 and 29 years, but 57.5% of the workforce in the sector aged between 30 and 49 years. Hence, a paramount reason for future labour shortages in the transport sector will be retirement.

Drivers of change

The report lists several exogenous and endogenous factors that are influencing the development of the transport industry.

The most important exogenous factors include:

- globalisation and world trade: world trade plays a key role in explaining the demand for transport services;
- geographic mobility;
- prices of natural resources: the price of oil and other natural resources is highly relevant for developments in the transport sector because oil prices amount to about 30% of transport costs;
- an ageing and declining workforce: population growth in Europe is expected to slow down or reverse in coming decades, resulting in an ageing population, with implications for the transport sector in terms of a contracting workforce;
- technology development – several innovative technological developments in ICT and vehicle technology will have substantial impacts on the transport sector; these developments include: technology in the vehicle (e.g. onboard computers, GPS, and lane warning systems); technology in the infrastructure (e.g., dynamic route information panels and satellite navigation); technology at the home base of transporters (e.g. advanced planning and routing systems);
- Evolving demands of customers: for instance, demand for cleaner and safer transport can strongly influence developments in the transport sector; increasingly, manufacturers and retailers ask transport companies to show that their transport is done safely and with a smaller carbon footprint;
- growing income per capita: the growth in the income per capita in the EU will have an indirect effect on transport demand, because with higher income citizens will spend more on imported articles for which more vehicle-kilometres are driven (in the NMS in particular there is considerable potential for growth in income).

The most important endogenous factors include:

- Environmental regulations: EU environmental policies are aimed at reducing carbon emissions and other negative effects of transport; the extent of these policies is highly relevant for developments in the transport sector;
- quality standards e.g. the broad range of ISO certificates;
- labour market regulations: due to policy harmonisation, the labour market in the EU may become more or less flexible;
- vehicle legislation: national legislation on the use of trucks and other heavy vehicles can stay relatively unrestricted or become stricter;
- safety policies, including safety legislation regarding trucks and other heavy vehicles;
- road tolls.

Emerging skills and competencies

The second part of the report analyses changes in the occupational structure of employment in the transport and logistics sector in the EU over the period 2000 to 2006. (European Commission, 2009g). Data presented in the report suggest that a number of occupations – managers and higher officers such as pilots, ship officers (both at sea and inland) as well as stewards have not changed their proportion of total employment in the sector. The proportion of business and logistics professionals increased as did the share of freight handlers and the combined function of drivers/ship crew. Administrative personnel and mechanics saw a relative decline during the last years.

Scenarios and implications for the future

The following four scenarios for the European transport sector were identified.

Scenario 1: Unrestricted transport growth

In this scenario the increase in world trade is high (over 3% per year) as is the price of oil and other natural resources. The decrease in the workforce is moderate and the level of technological innovation high. Incomes are on the rise. Demand for transport services increases, especially these with a small carbon footprint. EU regulations regarding both the environment and the labour market remain relatively unrestrictive, as does national safety legislation for trucks and other heavy vehicles.

Scenario 2: Unrestricted transport stagnation

In this scenario, the increase in world trade is moderate (less than 3% per year) and the price of oil and other natural resources relatively low. The decrease in the transport workforce is considerable and the level of innovation low. Demand for transport services increases moderately along with moderate growth in income per head. Environmental, labour and safety regulations are not restrictive.

Scenario 3: Restricted transport growth

In this scenario, the increase in world trade is high (at more than 3% per year) and so is the price of oil and other natural resources. The decrease in the workforce is moderate and the level of technological innovation is high. Demand for transport increases strongly along with robust growth in incomes. Environmental policy becomes stricter, as does regulation of the labour market, safety legislation and road tolls.

Scenario 4: Restricted transport stagnation

This scenario foresees a moderate increase in world trade (at less than 3% per year) and in incomes and demand for transport. Prices of natural resources are low; government safety, health and environmental regulations are stricter, as are restrictions on the transport sector.

It should be borne in mind however, that the growth potential for cargo road transport seems to be limited because of the capacity of the infrastructure and environmental aspects. This highlights the importance of developing greener modes of transport e.g. rail and 'clean' vehicles and promoting intermodal transport – for instance, by fostering cooperation between road and train companies and integrating different types of infrastructure.

Consequences for competencies and occupations

Different scenarios have different consequences for the competencies and occupations needed by different types of transport (see Table 8).

Table 9: Expected volume changes in job functions under different scenarios

Subsector	Function	Unrestricted growth	Unrestricted stagnation	Restricted growth	Restricted stagnation
Road transport	Managers	I	M	M	D
	Business professionals	I	M	I	M
	Logistics professionals	I	M	I	M
	Administrative workers	I	D	M	D
	Mechanics	I	D	I	D
	Road drivers	I	M	M	D
	Freight handlers	I	M	I	D
Sea transport	Managers	I	M	I	M
	Ship officers (sea)	I	M	I	M
	Business professionals	I	I	I	I
	Logistics professionals	I	I	I	I
	Administrative workers	M	D	M	D
	Mechanics	I	M	I	M
	Ship crew	I	M	I	M
	Freight handlers	I	M	I	M
Inland waterways	Ship officers (inland)	M	D	I	M
	Ship crew	M	D	I	M
	Freight handlers	M	D	I	M
Train transport	Managers	M	D	M	D
	Business professionals	I	M	I	I
	Logistics professionals	I	M	I	I
	Administrative workers	M	D	M	D
	Stewards	M	D	I	M
	Mechanics	M	D	I	M
	Rail drivers	M	D	I	M
	Freight handlers	M	D	I	M
Air transport	Managers	I	M	M	D
	Pilots	I	M	I	M
	Business professionals	I	I	I	I
	Logistics professionals	I	I	I	I
	Administrative workers	M	D	D	D
	Stewards	M	D	I	M
	Mechanics	M	D	I	M
	Freight handlers	M	D	M	D

Note: *D – decrease, I – increase M - maintain*
Source: *European Commission, 2009g.*

The results of the 'Unrestricted transport growth' scenario are similar for most subsectors – an increase in demand for most job functions. Increase in employment in this scenario is however less evident for inland waterways and train transport, which is a continuation of the present situation.

The 'Restricted transport growth' scenario has a more varied outcome, due to substitution effects (e.g. a shift to safer and cleaner transport) that are especially relevant in certain subsectors.

The second and fourth scenarios, in which growth in demand for transport services stagnates, see a decrease in demand in most function types, although the decrease is different depending on the number of restrictions and the substitution effects.

Future developments will pose a variety of challenges to the education and training system for transport employees.

- Internationalisation of the production of goods and services will lead to ever more complex supply chains, more cross-border traffic and intermodal transport; multi-skilling, languages, and intercultural skills are emerging as important, particularly so for the higher- and medium-skilled jobs in the transport sector;
- fierce national and European competition in the transport sector leads to low profit margins and little resources for staff training; this is particularly acute for SMEs in the road and inland waterway transport and low-skilled occupations;
- staff will increasingly require training to adapt to technological developments (e.g. GPS, RFID, e-tracking);
- increasing skills needs and pressures to improve working conditions and the image of the sector may aggravate problems with recruitment and retention of staff; in some countries, there is already a shortage of skilled road drivers – especially long goods-vehicle drivers;
- although the workforce is presently dominated by older men, the need is growing to make it more diverse, in terms of age, gender and nationality, in order to adapt to the growing internationalisation of the transport sector and its specific demand for multicultural, communication and language skills.

Strategic choices and recommendations

The Commission's study draws a set of conclusion and policy recommendations.

- **Integrate national transport systems** in order to progress towards an efficient multimodal trans-European system; lack of integration hinders trade, mobility and growth;
- **Improve the image of the sector** Career guidance for job entrants is necessary to attract more qualified workers; harmonisation of European or international health and safety regulations may also help with recruitment and retention of staff;
- **Institute Europe-wide recognition of skills** In order to ensure the meeting of international standards and facilitate required mobility of labour, a common European system for the recognition of skills and a corresponding adaptation of national initial vocational training is recommended for train drivers and

stewards in the sector; the European Qualification Framework can provide a common basis from which the European transport sector can pursue this aim;

- **Facilitate training cooperation between SMEs** The prevalence of SMEs in particular in the road transport and inland waterway transport sector makes cooperation for initial and continuing vocational training necessary; existing models should be made public and good practice examples should be disseminated; joint training networks should be used for apprenticeships but also for the training of existing employees;
- **Bring engineering and science to the classroom** In several European countries initiatives to improve the image of engineering professions are underway, some of them also with a clear focus on attracting pupils to the sector – in particular, railways; initiatives of this kind should be elaborated, expanded, and disseminated across Europe;
- **Collaborate** The challenge of overcoming sectoral skill gaps and staff shortages will only be met if industry, training providers, social partners, research institutions and public authorities act in concert. Collaboration is required not only to meet skills needs, but (and perhaps even more importantly) also to support the development of sectoral learning strategies.

Health and social care

6

The importance of the sector in Latvia

The health and social care sector (NACE 85) comprises human health activities (hospitals and medical and dental practices), residential care activities (nursing, mental health, elderly care and care of the disabled), social services activities without accommodation (elderly care, disabled care, child daycare) and veterinary activities.

The Commission's report does not provide figures on employment or value added in the sector in Latvia (European Commission, 2009h). Data presented by the Latvian Statistical Office suggest that in 2006 the gross value added of health and social care was around 2.9% of the total output of the economy. This suggests that health and social care is less important in terms of output for the Latvian economy than it is on average in the EU (at 7.1%) and in the NMS (4.5%).

Europe-wide trends for output and employment

The European health and social services sector in 2006 accounted for a value-added of over €800 billion. The NMS accounted for only 3% of the total EU value-added of the sector. All Member States witnessed a growth in value-added created by the sector. The pace of growth is still slower in the NMS than in the EU15; however in recent years it accelerated rapidly (from 0.2% before 2000 to 2.1% after 2000).

Employment in the sector in the EU amounted to about 20 million workers in 2006, the majority of whom (about 17.7 million) live in the EU15. In recent years, the workforce has grown much faster in the EU15 than in the NMS.

The workforce in health and social services is dominated by women, who form not less than 78% of the workforce. Both in the EU15 and the NMS, 43% of workers are aged under 40 years. However, in the EU15, this share has been decreasing sharply since 2000. Workers in health and social services have often a medium or a high level of education. In the EU15, not less than 40% of the workers have a high level of education.

Drivers of change

A number of drivers are affecting developments in the health and social services sectors. The key drivers identified are listed below.

- Ageing of the population increases demand for health and social work and restricts labour supply;
- Technology may stimulated demand for health care (especially better diagnostics) but also may be a substitute for labour (especially in ICT, medical and assistive devices and medicines); future developments are uncertain and different scenarios of technological development are plausible.
- Life style: major differences are present between life styles resulting in an individual setting promoting formal and paid care and social services and life styles resulting in a social setting promoting informal care and social services by family, friends and voluntary organisations.
- Income: growing income stimulates demand.

- Labour markets may be flexible and therefore able to quickly restore imbalances between demand and supply of labour; they may instead be inflexible.
- Trade and product market regulation – the institutional setting can induce or impede efficiency. Trade and market regulation is defined broadly and comprises possibilities such as better information to customers, revision of the finance system, partial reimbursements, new work organisation forms that increase efficiency, competition in parts of the sector, benchmarking, combining public and private possibilities to produce services and regionalising production at a scale higher than the national level.

Emerging skills and competencies

As shown in the following table, personal care and related workers have the largest share in the health and social services sector in the EU15 at 27%. For the NMS, nursing and midwifery professionals are the most common occupation (23%). Other important occupations include social science professionals, health associate professionals, health professionals and other professionals and technicians. Low occupation shares are represented by craft trades workers and machine operators, domestic helpers, elementary occupations and other service workers.

Generally speaking there have been no major changes in shares of occupations between 2000 and 2006. Some exceptions exist, however, the most obvious one being a decline of 11% for other professionals and technicians in the NMS, as well as a decline of 5% for other service workers in these countries. This was offset by a 6% increase in occupations for personal care and related workers, health professionals and health associate professionals. It is possible that these large changes are the result of improved administration resulting in fewer people assigned to the 'other' categories. For the EU15, a 5% decrease in the share of nursing and midwifery professionals is notable.

Table 10: Employment trends by job function – shares (2006) and changes in shares (in%), 2000–2006

	Shares			Changes in shares		
	EU15	NMS	EU	EU15	NMS	EU
Managers	3	3	3	1	0	1
Health professionals excluding nursing	9	16	10	-1	4	0
Nursing and midwifery professionals	16	23	16	-5	1	-4
Health associate professionals	8	13	9	3	4	3
Social science professionals	8	4	8	0	2	0
Other professionals and technicians	10	10	10	0	-11	-1
Clerks	8	4	7	0	0	0
Personal care	27	12	25	2	6	2
Other services	3	3	3	0	-5	-1
Craft trades, machine operators	2	4	2	0	-1	0
Helpers, cleaners, launderers	5	6	5	1	0	1
Elementary occupations	2	2	2	0	-2	0

Source: *European Commission, 2009i.*

Scenarios and implications for the future

Three scenarios of future development of social service sector by 2020 are presented in the report.

Scenario 1: Care central

In this scenario, ageing exerts pressure (as in all scenarios) on health care and residential care for the elderly. However, technological developments help to accommodate this pressure by substituting skilled and unskilled labour. This is especially the case for health care. Examples are special forms of robotics (meaning less labour needed), minimally invasive surgery (resulting in less rehabilitation and internal care) and pharmaceuticals (with medicines substituting for operations and shortening internal care). ICT developments help to increase efficiency of social services. At the same time limited income growth results in only small increases in demand for care. The social culture stimulates informal care, resulting in a use of formal care only when informal care is not available. This has an especially large influence on residential care (with disabled and elderly persons taken care of mostly by family and friends) and social services. In the 'Care central' scenario regulation is suboptimal. The labour market is inflexible, efficiency improving instruments (where possible) are not used, regulation is weak and the quality of institutions poor. This, however, is not a major problem since the exogenous drivers result in little pressure on the system.

Scanario 2: Care gap

In the 'Care gap' scenario the demand for budget and labour increases as a result of ageing and rising income levels. Demand is further increased by the individual life style. Formal care is preferred as informal care is seen as second-class and its availability is limited. Social services are much more used and residential care rises sharply. Technological developments stimulate a large increase in care demand (e.g. advanced medical devices, assistive devices and appliances). Technologies substituting labour are available, but expensive technologies stimulating budgets and labour increase much faster. The system is strained as budgets and labour demand explodes.

In this scenario regulation is still suboptimal and not able to address the imbalance between demand and supply. Now, the inflexibility of the labour market becomes a problem. Not enough people are stimulated to work in the healthcare and social services sector. Special sector regulation is not in force, resulting in fast growing waiting lists as a result of shortages in labour due to maximum budgets or in sharp increases in demand for labour and budgets. The system is still supply driven, but the supply of labour or budgets cannot cope with the pace of demand growth. Many parties observe that the system cannot cope with the challenges. However, the quality of institutions is poor, resulting in policy reactions that do not solve the problems.

Scenario 3: Flex care

In 'Flex care' the exogenous drivers are the same as in 'Care gap'. The main difference is in the endogenous drivers. Now policies are initiated and successfully implemented in order to solve the main problems identified in the former scenario. The labour market is flexible and helps to accommodate the increasing demand for care. Workers are employable and switch jobs if necessary. Trade and market regulation is implemented to use efficiency-improving possibilities, which lead to a relative reduction in demand. The system is now demand driven, allowing the supply of care to more effectively and efficiently adapt to changes in demand. However, absolute demand still increases due to ageing, technology, life style and income. The quality of institutions is good, resulting in adequate policy reactions to remaining problems. The main question is whether the demand

for labour and skills can be accommodated. It should be very clear, that what is meant by 'trade and market regulation' does not imply at all that the whole sector is governed by private firms. Instead, large parts of the sector (e.g. the main parts of social services) will be organised as a public service. However, what is meant is that regulation is used to increase efficiency as much as possible whether privatisation or liberalisation takes place or not. Benchmarking, for instance, could provide efficiency incentives when other market-oriented options are not possible. Given the nature of most services it is of course essential to implement policy changes that are in line with this. In some cases this will mean that the market itself can be used to fulfil public goals. In other cases economic forces will undermine public goals. But in all cases the maximum should be done to increase efficiency as long as it is not hindering other public goals.

Consequences for competencies and occupations

Across all job functions, soft skills will become increasingly important in the coming years, especially for high-skilled professional job functions. The general trend of upskilling is bound to continue. Due to the changing nature of jobs, predefined technical knowledge capabilities will become somewhat less important while the ability to adapt and learn new competences will be put at a premium. IT skills will become more important. Emerging competencies of higher-skilled jobs mostly refer to *how* to learn, communicate, interact and adapt to changing environments in addition to a high quality education. Emerging competences in medium-educated job functions that mostly execute defined tasks and processes refer mostly to specific knowledge sets that can be taught through learning.

Key emerging skills and knowledge needs by job function can be described as follows.

Managers

Managers face completely different surroundings in the three scenarios. In 'Care central' the main challenge is to cope with increases in demand. This results in large costs for governments and clients, but this is not the main problem for managers. They invest in accommodating increasing demand. These investments become more troublesome in 'Care gap' as there is now a shortage in money to finance the growing demand. Managers have to use more skills to cope with demand given the shortage in supply. In 'Flex care' managers are supported by much better regulation. However, this demands a totally different attitude of managers. Management skills will change mostly in 'Care gap' and 'Flex care'. Key changes include technical knowledge enabling managers to deal with innovations (in all scenarios), e-skills in order to keep up with the increasing ICT use in the sector (all scenarios), and communication and team working skills (particularly in 'Flex care). Problem solving skills are needed to cope with the imbalance of demand and supply in 'Care gap' and with the rapid changing external surroundings in 'Flex care'. Self-management competences, more efficient planning, stress and time management and flexibility are asked from managers in different scenarios. Entrepreneurship skills are especially needed in 'Flex care' for managers working in a market environment. Quality and process management skills are needed especially in Care gap and in Flex care.

Medical doctors

Medical doctors need skills to guarantee that their primary task, providing patients and clients with health services, is done adequately. In all scenarios, therefore, they need technical knowledge to perform medical tasks adequately. IT skills do deal with the increasing role of ICT (both for diagnostics as well as treatment and contact with patients); the internet and electronic patient dossiers are also key tools. Good communication

skills and adequately understanding patients and customers requires increasingly high-quality communication levels. A range of analytical skills to solve problems quick and adequately as well as creativity to cope with persisting problems in complex organisations are needed for doctors. Other soft skills are strategic and visionary skills to show leadership, coaching and team building to optimise team capacity and a collegial management style to improve the efficiency of teams. In the 'Care gap' scenario these skills are even more important as the system is under pressure given high increases in demand and budgets that are under pressure. This pressure is lower in 'Flex care', but here governments, regulators, clients and patients require more flexibility from the sector.

Health associate professionals

Skills that are more needed for health associate professionals in the future in all scenarios are technical knowledge to guarantee state-of-the-art services, which is of course, essential for the professionals, IT skills to deal with the increasing role of ICT (both for diagnostics and treatment) and use of the internet (to communicate with clients and patients). Communication skills are required to react adequately to rising demands from clients and patients as they require quicker and more contacts. Other important soft skills are intercultural skills, to deal with the increasing diversity in society and flexibility to deal with changing organisations and tasks (more multi-skilled and multi-disciplinary). Finally, quality management to optimise the quality of services is important in all scenarios. In 'Care gap' some extra skills are necessary to deal with the system imbalance between demand and supply. Skills that can help to optimize capacity include better teamworking and planning skills and project management and process optimizing skills to minimize waiting time and lists. At the same time better stress and time management skills are needed to cope with the high system pressure. In 'Flex care', especially for professionals working in small units additional skills are needed including entrepreneurship, networking, and problem-solving skills.

Nursing and midwifery

For nursing and midwifery staff it will be important to keep up with technological and demographical developments. The application of new technology will make more sophisticated technical and IT competences essential for nurses. A decreasing birth rate along with an ageing population will generally shift demands and tasks within this profession from midwifery to the care of elderly population. A greater demand by mostly elderly patients requires highly qualified and specialised nursing. Especially in nursing, we expect increasing specialisation to go along with an increasing differentiation of tasks, i.e. cure nursing in hospitals and clinics and care nursing in retirement homes. E-skills are needed to use ICT in diagnostics, treatment and electronic patient dossiers as well as internet to communicate with patients and clients. Social perceptiveness will become an asset as patients and clients increasingly find it important that not only health services are supplied but that these are combined with a socially understanding attitude. This requires intercultural skills as the diversity in societies increase and patients and clients demand that their cultural identity is respected. Flexibility (especially in 'Care gap' and 'Flex care') as health care providers are searching for ways to optimize their 'production' process is important.

Social workers

Demand for social workers will increase in all scenarios. This is especially the case in scenarios with a more individual lifestyle and high income growth. Also ageing results in more demand for social workers. For the emerging skills it is more important that the same drivers result in a changing content of the work. For all scenarios it is expected that the following skills become more important. Social skills as networking become

more important as it increasingly is vital that all relevant stakeholders and helpers are integrated in one approach. Language and intercultural skills increase in importance due to a more diversified mix of clients. Coaching and team building is necessary to cope with the increased complexity due to more disciplines working together. In 'Care gap' and 'Flex care' additional skills are needed such as legislative and regulatory knowledge in 'Care gap' to use this knowledge to diminish the pressure of the system as demand for help is higher than supply of workers and budgets. In 'Flex care' this is essential as many things change. Problem solving and self management skills are increasingly important, again due to the pressure of the system in 'Care gap' and the needed flexibility in 'Flex care'.

Support workers

Due to the rapid technological development in this sector, job functions are expected to undergo a general upgrading, i.e. better educated and specialised employees are needed. This will make low-educated workers generally less attractive for this sector. The competence catalogue itself is not expected to change substantially for low-educated employees such as cleaning personnel, launders, clerks, helpers. However, as the working environment will become more international and interdependency will increase under the great demand pressure due to population ageing, social skills are likely to be demanded to a higher degree in the future. In 'Flex care' more flexibility is needed from support workers.

Strategic choices and recommendations

In order to meet future skills and knowledge needs, apt and timely solutions – referred to as strategic choices – are required. Strategic choices relate to the medium- and long term strategy, even though emerging skills and knowledge needs in practice may also apply now and tomorrow. Essential in seeking appropriate solutions is to keep this longer time perspective in mind. Rather than focusing on one single solution, a set of linked strategic choices will in most cases be the best strategy to follow. Prioritising both in time (what first, where to follow up) and in allocation of resources (including budgetary focus) followed by further fine-tuning is a clear necessity to guarantee that skills needs are targeted and solved.

Skill needs can be identified at various levels, ranging from assessments at the national or even European sector level to more precise assessments at the regional and company/institution level. In order to address the identified future skills and knowledge needs in an encompassing and timely manner, appropriate joint action is needed by all stakeholders, including the industry (firms, sector organisations and social partners), training and education institutes, intermediary organisations and, last but not least, government at all levels (EU, national, regional and local). Collaboration is needed in order to agree on and implement a package of feasible solutions. Timely, targeted and reliable information to make decisions – i.e. adequate monitoring and analysis - is an essential prerequisite.

An example of the assessment of new skills for one job function category i.e. managers is presented in Table 11. The assessment starts with six questions the answers to which are relevant for the strategic options applicable in that job function. For example, if the workforce is generally old and low-educated certain options have specific implications for upgrading skills and competences. The table then presents 13 possible strategic options (A to M) to address skills and competence issues, assessing for each option whether it is feasible for managers, and if so, who are the key actor to take action.

Table 11: Example of strategic options decision tool – job function: medical doctor

1. What is the maximum volume effect?	Increase	
2. What is the maximum change in skills?	26	
3. Do SMEs play a large role?	Yes	
4. Is the sector national/ EU/ global?	National	
5. Is the workforce older?	No	
6. Is the workforce poorly educated?	No	
Option	**Is this option viable**	**Actors**
A. Recruiting workers from other sectors	No	C, I, G
B. Recruiting workers from other Member States	Yes, but culture and language and ethical issues	C, I, G
C. Recruiting workers from third countries	Yes, but culture and language and ethical issues	C, E, G
D. Recruiting unemployed with or without re-training	No	
E. Recruiting young people from the education system	Yes, essential. Guarantee that enough students enter education	C, E, G
F. Training and re-training employed workers	Yes, but limited	C, S, E, U
G. Changing work organisation	Yes, mainly flexcare (task division – higher level, medium level) and telemedicine	C, P
H. Outsourcing and offshoring	No, but for lab tests and reading images	C, U
I. Changing vocational education	Yes	G, S, E, U
J. Designing and offering new courses	Yes, see above	C, S, E, U
K. Providing information about emerging skills	Yes, always good	C, S, U
L. Improve the image of the sector	For some specialities	C, S, I
M. Stronger cooperation between stakeholders	Yes	All

Notes: 1. *C (company), S (sector organisations, including scientific associations and chambers of commerce), E (education & training), G (governments), I (intermediary organisation, public or private), U (trade unions).*
Source: *European Commission, 2009h.*

At the more general level, **recommendations for education and training** are to adapt and modernise education and training systems, enhancing flexibility and modularisation. It is also very important to focus on multi-skilling to prepare workers for rapidly changing work situations and for the need to engage in life long learning. Staff retention is an important issue in the sector and developing special courses for older workers will be essential. Information and career guidance for labour market entrants will also be needed.

Other recommendations include improvement in cooperation between stakeholders in the health and social services sector to anticipate future changes. There is a need to invest in human capital, in IT skills and technological knowledge. More generally it is important to evaluate the effects of income and working conditions on the supply of labour for specific job functions. Finally, the health and social services sector is highly regulated and effects on the volume of labour and the skills needed should be a key consideration when changes in the regulatory system are designed.

Patterns of employment expansion in Latvia, 1998–2006

7

This section looks at the evolution of employment growth in Latvia in the period 1998–2006, from the perspective of the quality of jobs, within a European context. What kind of jobs were created and destroyed in Latvia from 1998 to 2006? Did Latvia create more and better jobs?

The results are based on a detailed analysis of the evolution of employment by sector and occupation in twenty three EU member states covering the period 1995–2006. In each country, a table of jobs defined as specific occupations within specific sectors was created. Then, the median hourly wage of each of the jobs in that table was calculated, and this was used for rankings all the jobs from highest to lowest pay in each country. Then, total employment in the middle of the period (the year 2000) was divided in five equal-sized groups, ranked from lowest to highest pay. This allows a breakdown of the overall figures of net employment creation from 1995 to 2006 into five job quality (or ranked hourly pay) groups. In the case of Latvia, for reasons of data availability, the period covered was 1998–2006.

Absolute employment growth by job quality, 1998–2006

Figure 5 shows a breakdown of net employment growth or decline for each of the five job quality groups. The blue bars represent change in the number of jobs (in thousands) for the whole period 1998–2006 and the empty boxes represent change that occurred during its first two years.

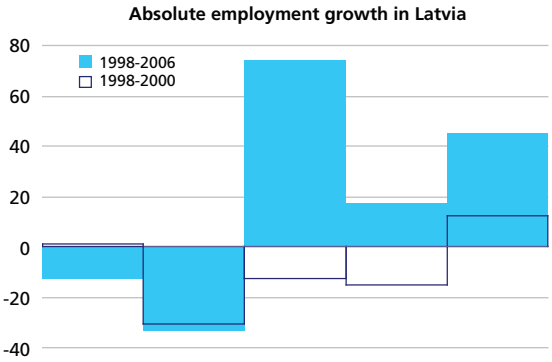

Figure 5: Absolute employment growth in Latvia

Over the period 1998–2006 about 90,000 net new jobs were created in Latvia, equivalent to a 6% increase in the workforce. Employment expansion took place mostly between 2000 and 2006, while earlier years witnessed mainly net job losses. The employment pattern of the period 1998–2006 was characterised by a considerable growth in the employment in jobs in the middle of the wage scale. However, some signs of upgrading are visible in recent years: a moderately high number of jobs was created in the top two quintiles of the wage distribution while destruction took place mostly in the two lowest job quality groups.

Relative employment growth by job quality: contextualising Latvian results

To be able to compare the patterns of employment growth across different countries, it is necessary to look at relative rather than absolute changes in the size of each of the quintiles (i.e. in the percentage employment change per year within each of the quintiles). This is done in Figure 6 for Latvia, for Estonia and Lithuania, and for Slovenia and Finland.

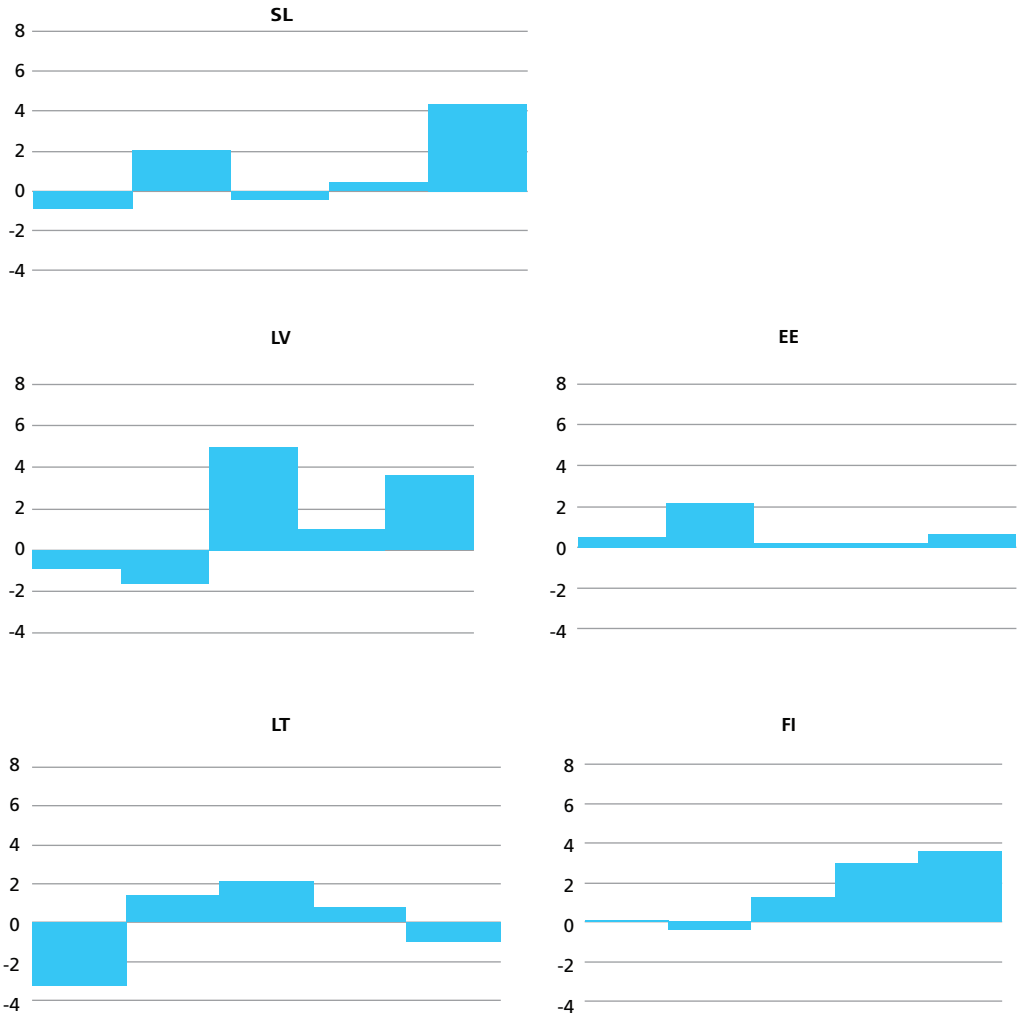

Figure 6: Employment change by job quality

The development in the three Baltic States could be expected to be relatively similar yet the differences between them are more pronounced than the similarities. Lithuania shows the clearest pattern of employment growth in the middle of the distribution, with considerable job destruction at the extremes, especially in the lowest quintile where the destruction rate amounted – on average – to 3% a year. Also Latvia exhibits this pattern of growth in the middle pattern – job creation of a rate as high as 5% a year was registered in the third quintile. However, unlike in Lithuania, moderate growth was registered also in the top quality group, which brings Latvia closer to the 'upgrading' model, demonstrated here by Finland. Estonia witnessed only modest net growth rates in each quintile.

Growth patterns by sector

The following figures break down the absolute job growth in the five job quality quintiles by broad economic sector. The light blue bars on the background represent overall employment change, and the dark blue bars in the front the contribution of each specific sector.

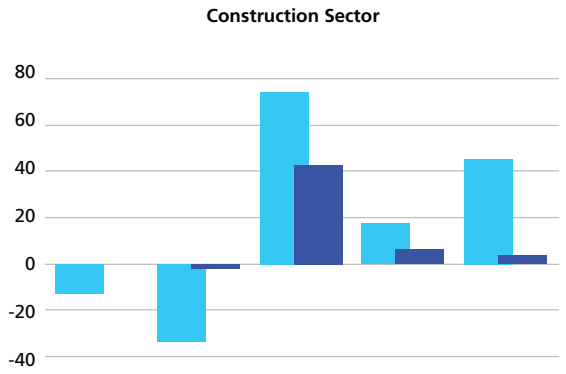

Figure 7: Construction sector

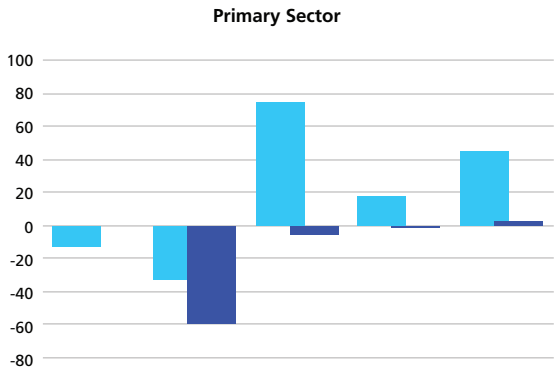

Figure 8: Primary sector

The primary sector (agriculture, fishing and mining) did not contribute to job creation in Latvia in the period 1998–2006. There was a general destruction of jobs in this sector, mostly in the second quintile. Construction, on the other hand, created jobs. It was responsible for more than a half of the net employment growth in the median quintile of the employment structure. It also contributed modestly to the growth in the two upper quintiles.

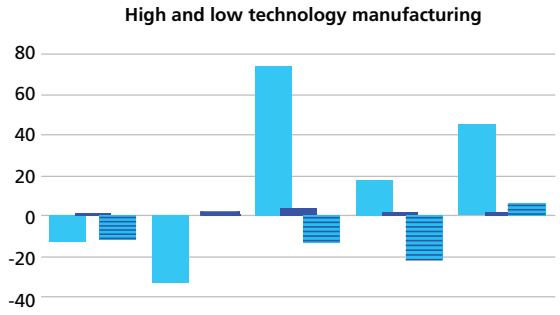

Figure 9: high and low technology manufacturing

There was a net destruction of jobs in manufacturing in Latvia. The low technology industries are represented with the striped bars and the high technology industries with the dark blue bars. While high technology manufacturing activity expanded slightly across all quintiles, low technology industries declined substantially, resulting in the net job loss in manufacturing of 34,000 jobs.

Figure 10 shows a breakdown of the services sector into high and low knowledge intensive subsectors. The striped bars show the contribution of low knowledge intensive services to overall job creation and the dark blue bars – the contribution of high knowledge intensive services. Both showed a slight upgrading, with low knowledge intensive services expanding more strongly than high knowledge intensive ones. Most jobs in services were created in the middle and some - at the top of the wage distribution.

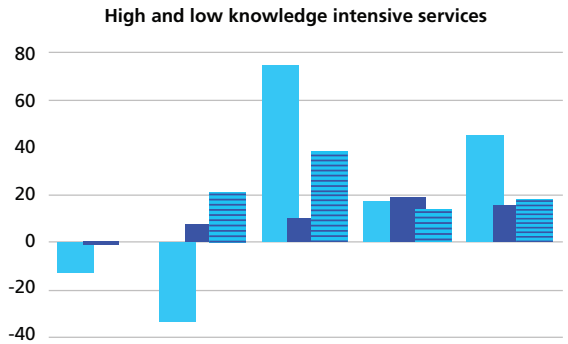

Figure 10: High and low knowledge intensive services

Type of contract: part-time and non-permanent employment

The following two figures break down employment growth by type of contract. In both cases, the light blue bar in the back represents net employment growth for the "standard" employment contract (full-time or permanent) and the dark blue bar on the front the non-standard' employment (part-time and non-permanent).

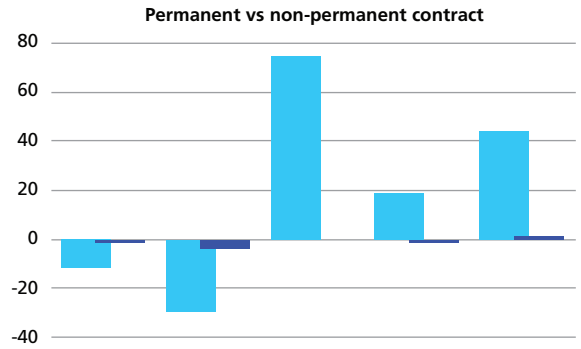

Figure 11: Permanent vs non-permanent contract

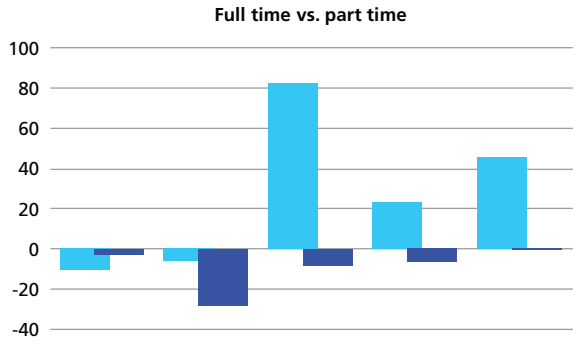

Figure 12: Full time vs part time

Unlike many other European countries Latvia experienced a decline in non-standard employment contracts during the period 1998–2006. There was almost no net employment change in the number of non-permanent contracts, with a slight decline registered in the two lowest quintiles and a modest growth in the highest. Moreover, there were 46,000 fewer part-time jobs at the end of the period compared to the beginning. This means that the job destruction in the second lowest job quality quintile in Latvia was accounted for mainly by a loss of part-time but permanent jobs.

Patterns of employment growth by gender

Finally, Figure 13 shows a breakdown of the patterns of employment growth by gender. Men are represented as light blue bars and women as dark blue bars.

Unlike the majority of European countries, employment growth in Latvia was not greater for women than for men. However, there were considerable differences in terms of job quality. Men's employment growth was the

highest in the middle of the wage distribution whereas for women there was a much clearer upgrading, with most jobs created in the two highest quality groups.

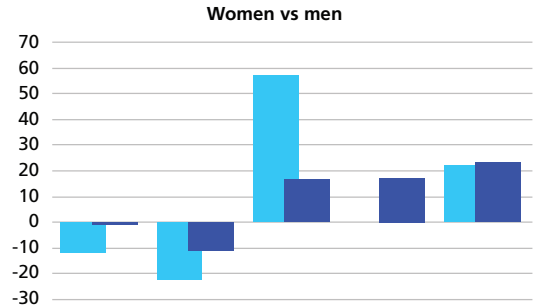

Figure 13: Women vs men

Data sources: for the evolution of employment by occupation and sector, European Labour Force Surveys 1995–2006; for the ranking of jobs by wages, European Structure of Earnings Survey 2002 and EU Statistics on Income and Living Conditions (SILC). Statistical processing and modelling by Eurofound.

This information draws from the Eurofound report *More and better jobs? Patterns of employment expansion in Europe, 1995-2006*, published in 2008.

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