The Estonian Economy

Business sector digitalisation and automation: opportunities and challenges

- Estonia has been in the forefront of e-Government solutions, but integration of innovative digital technologies in the business sector is still below the European Union average.
- Estonian manufacturing robot density is well below the average of the European Union and the rest of the world. About one-fifth of the work processes in the manufacturing industry are automated.
- Companies' investments in machinery, computer software, and R&D make up about 39% of total investments. Although this share has been growing in recent years, the share of companies' total investments in GDP is on a downward trend, which has a negative impact on the growth of productivity-raising capital.

In the post-crisis period, rapidly growing labour costs have been outpacing labour productivity growth, which has contributed to enterprises' waning profitability and competitiveness. The scarcity of labour has become an important factor limiting businesses. In the future, the ageing population and diminishing labour force will hamper output growth and increase the need for productivity growth. Technological change and innovation can be key for boosting productivity growth and achieving sustainable economic growth. However, an important prerequisite for enterprises' higher investments and productivity growth is higher demand, in our small and open economy–foreign demand.

Estonia is among the global leaders in digitalisation, especially in terms of e-Government solutions. However, the digitalisation and automation of the business sector is still lagging the rest of the European countries. One of the weaknesses in this case is Estonian business sector demography as majority or more than 90% of enterprises are small companies with fewer than 10 employees. These enterprises may lack employees with technical skills and may face financial barriers to investing in new technologies and innovation. In line with investments in automation and digitalisation, there is a greater need to invest in the digital skills and competences of employees, while educational system should also support more higher technological qualification. According to *Swedbank's Industrial Survey*, Estonian manufacturing companies see the shortage of labour with appropriate skills as one of the main factors restraining automation and digitalisation.

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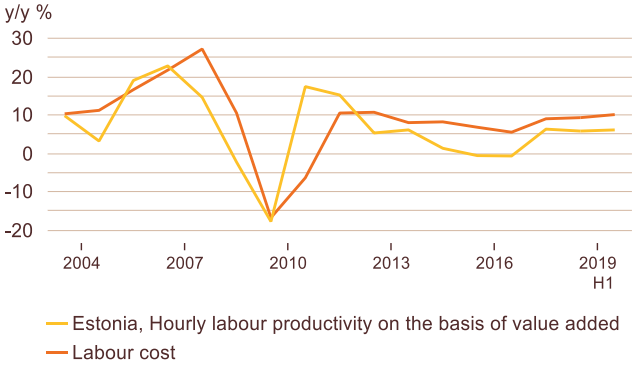
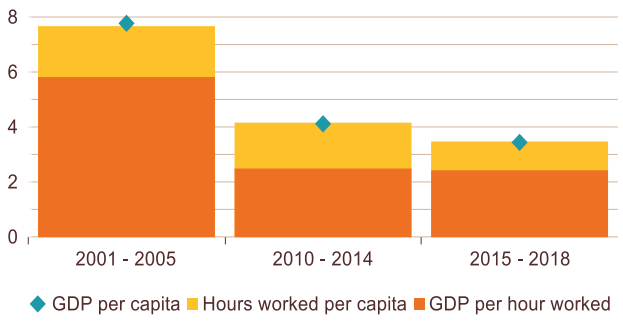
Labour cost and productivity



Sources: Statistics Estonia, Swedbank Research & Macrobond

Growth in labour productivity and labour utilisation
Average growth of a period



Sources: Swedbank Research & Macrobond

Contribution of labour productivity growth to economic growth is waning

Labour productivity growth was the main driver of economic growth in the pre-crisis period. The picture has changed after the crisis: weaker average productivity growth has been a major concern. However, since 2017 labour productivity growth has been more rapid, which was mainly supported by higher demand. In recent years, another issue has been the tight labour market–the scarcity of labour has become an important factor limiting businesses.[1] Since 2012, the growth of labour costs has been outpacing labour productivity growth; this, in turn, has contributed to enterprises' waning profitability and has been jeopardizing price competitiveness in export markets. To reduce the labour intensity of production and boost productivity, companies should invest more in digitalisation and automation. On the other hand, companies depend to a large extent on demand. Without higher demand, it is difficult to achieve the scale effect and raise productivity. In addition, implementation of innovative technologies is creating a greater need for digitally skilled labour and labour with the higher technological qualification.

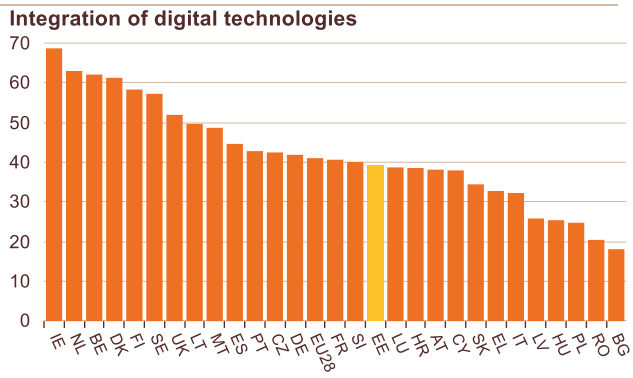
The future decline and ageing of the population, and, hence, the shrinking of the labour force, will hamper output growth. Digital technologies have the potential to boost productivity and can alleviate the negative effect of future demographic trends on economic growth. The McKinsey studies estimate that in the past technological diffusion contributed on average 0.4 to 0.6 percentage points of GDP growth annually in digital front-runner countries; the potential GDP growth driven by technology is estimated to be around 1.2 percentage points annually.[2]

Estonian companies are still not taking full advantage of digital technologies

Measuring digital transformation is very complex, as it is reshaping different areas of the economy and society: from the integration of new technologies on a company level, to public sector and services, sharing platforms and new ways of working, improvement of the quality of life and education, etc. Estonia has been named as one of the best countries in terms of digital life, according to *Internations' 2019 report*. The Global Innovation Index ranks Estonia 24th in terms of innovation success. According to the IMD World Digital Competitiveness Ranking Estonia is on 25th place. The Digital Economy and Society Index (DESI), which measures the performance of the digital economy, places Estonia among the leaders in digitalisation.

Estonia has been in the forefront of e-Government solutions. The public sector plays an important role in the productivity gains of the business sector through digitalisation of public services. Innovation and digitalisation in the public sector are helping to improve the effectiveness of the public sector itself and provide more efficient public services to citizens and businesses. Companies benefit greatly from electronic

Sources: European Commission, Macrobond



Sources: European Commission, Macrobond

[1] Estonian Institute of Economic Research

[2] Shaping the future of work in Europe's digital front-runners, McKinsey&Company, Oct 2017.

authentication and digital signing, and the availability of public services like e-Tax and e-Business Register, while e-Identity has also made possible the development of high-quality online banking—all of which allows enterprises to save human resources.

Despite Estonia's global leadership in e-Government solutions and the rapid progress of new technologies worldwide, Estonian companies are still not fully exploiting the opportunities offered by innovative technologies. According to the DESI, the main challenge for the Estonian economy is the digitalisation of companies. The integration of digital technologies in the business sector in Estonia is below the EU28 average—Estonia came in 16th this year. However, in five years, Estonia has gained seven positions and moved closer to this average. One of the possible reasons for this weak performance could be the business demography, as more than 90% of enterprises are small companies with fewer than 10 employees. These enterprises may lack employees with technical skills and may face financial barriers to investing in new technologies and innovation.

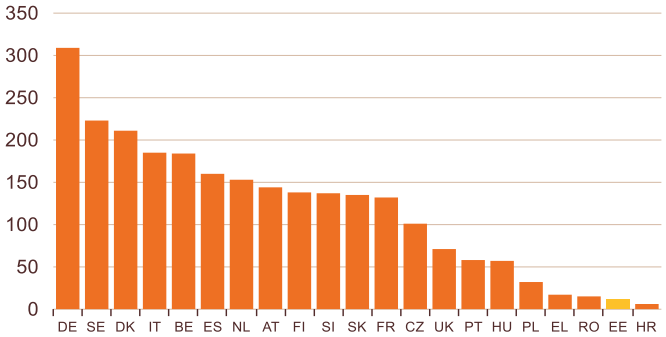
Estonian manufacturing industry digitalisation behind the rest of European countries

The new industrial revolution is putting pressure on manufacturing sectors worldwide, and the integration of digital technologies and industrial robots will continue to play a key role in productivity gains for this sector. Previous studies have shown that the increased use of industrial robots has raised manufacturing companies' labour productivity and value added.[3] However, higher growth of productivity cannot be reached without higher demand. As Estonian manufacturing companies export about 70% of their turnover, this sector depends a lot on foreign demand.

Estonian largest economic activity, manufacturing, is far behind the rest of Europe and the world in regards to industrial robots' density. Last year, Estonia had 11 industrial robots per 10,000 employees[4] and thus was far behind its neighbouring countries–robot density was more than 12 times higher in Finland and more than 20 times higher in Sweden. Estonian manufacturing robot density was well below the average of the European Union, the region with the highest average robot density with the value of 115 units, and the global average of 74 industrial robots per 10,000 employees. According to *Swedbank's Industrial Survey*, 18% of manufacturing companies in Estonia are already using industrial robots and 18% are planning to invest in robots in the next two years. In addition, according to this Survey, on average 20% of the processes in the manufacturing industry are automated, and 54% of manufacturing companies are planning to invest in automation in the next two years.

Industrial robots density

Number of industrial robots per 10'000 employees



Source: International Federation of Robotics

[3] Robots at work. Centre for Economic Performance. March 2015.

[4] *World Robotics Report*. International Federation of Robotics - ceoworld.biz/2018/03/14/countries-with-the-most-industrial-robots-per-10000-employees-2018-report (Data available for 21 EU countries; BG, CY, IE, LV, LT, LU, MT excluded)

Implementation of innovative digital tools enables large and routine tasks to be replaced with robots, while workers can move to higher-skilled tasks. This, in turn, means that companies need employees with more complex skill profiles. Estonian manufacturing companies see the shortage of labour with appropriate skills as one of the main factors restraining automation and digitalisation. This makes it more important to invest in developing the digital skills and competences of employees in line with the investments in automation and digitalisation, while educational system should also support more higher technological qualification.

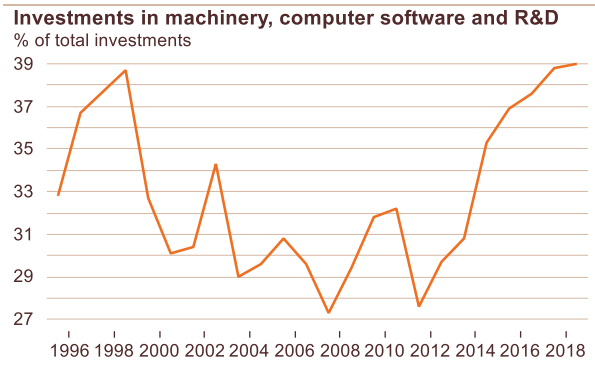
Tight labour market forces companies to invest more in technology and innovation

Although, companies may have different objectives–either automation of processes, launching new products, digitalizing operating model, or marketing processes, or interaction with business partners through digital channels–investments in different kinds of new technologies should have positive effect on productivity growth. Research has shown that investments in R&D also contribute positively to productivity growth as R&D is likely to be driven by some of the same factors as IT spending. [5]

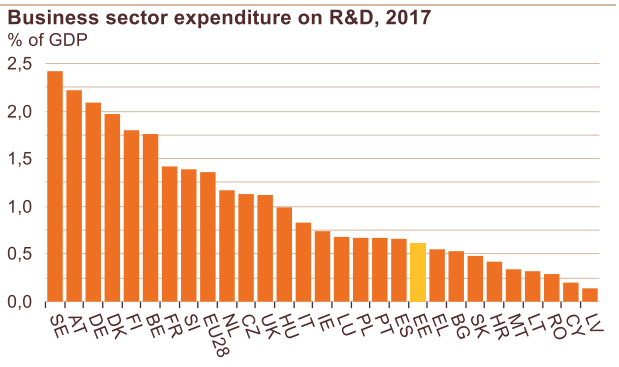
Due to the tight labour market enterprises have been forced to make higher share of investments in new technologies and innovation to boost productivity growth, especially in recent years. Estonian companies' investments in machinery, computer software, and R&D as a share in total investments is on an upward trend. In 2018, this share was record high – 39%, while pre-crisis average was about 30%. However, the waning share of companies' total investments in GDP has also the negative impact on the growth of investments in new technologies and innovation. Last year, the average share of companies' total investments in GDP was 13%, while the pre-crisis average was about 21%.

Since the financial crisis, the share of R&D expenditure in enterprises' total investments have been rapidly growing and reached around 4% in 2018, while this average was about 1% before the crisis. In international comparison, business R&D intensity or the ratio of business sector expenditure on R&D as a percentage of GDP was 0.6% in 2017 (and 2018), which was more than two times below the EU28 average. Estonian enterprises' R&D intensity level is far behind its Nordic neighbours', Finland and Sweden, although, higher than Latvia and Lithuania.

The total level of R&D intensity, or total expenditure on R&D as a percentage of GDP for Estonia was 1.3% in 2017. Although the 2020 target is 3% of GDP, since 2011 this ratio has been gradually decreasing. The R&D intensity level in Estonia is well below the EU28 average, which was 2.1% in 2017



Sources: Statistics Estonia, Swedbank Research & Macrobond



Sources: Eurostat, Swedbank Research & Macrobond

[5] http://ebusiness.mit.edu/erik/cp.pdf

Conclusions

Estonia is globally ranked relatively high in digital performance, mainly due to high public sector digitalisation, however, the integration of new technologies in the business sector is still weak compared to other European countries. Estonian manufacturing robot density is well below the average of the European Union and the rest of the world. One of the reasons of weak performance in digitalisation of Estonian companies could be business sector demography as more than 90% of enterprises are small companies with fewer than 10 employees. These enterprises may lack employees with technical skills and may face financial barriers to investing in new technologies and innovation. Another important prerequisite for achieving scale effect and higher productivity growth is also higher demand.

It is important not to postpone investments in new technologies and innovation that boost productivity growth. Although, in recent years, tight labour market has forced enterprises to make higher share of investments in new technologies and innovation, the share of companies' total investments in GDP is on a downward trend, which has a negative impact on the growth of productivity-raising capital. In addition, educational system should support more higher technological qualification of employees, while investments in digital skills of employees are becoming more important, as new digital tools replace routine work and employees should move to more complex tasks. According to the survey, the shortage of labour with appropriate skills is one of the main barriers restraining automation and digitalisation in manufacturing.

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