Chapter 4

Capacity building and public services in Sweden

Capacity building, including provision of essential public services, is one of the main channels to support innovation and sustainable development. This chapter focuses on three relevant policy areas: infrastructure and rural development policy; labour market policy; and education and skills policy.

Key points

- The overall quality of transport infrastructure in Sweden compares well with the OECD average and the quality of its electricity supply is considered as one of the best in the world.
- Sweden aims to take a leading role in digital transformation.
- New infrastructure is generally funded by the State budget.
- In the most remote areas of the country access to basic services has been decreasing, where the population is declining and provision of such services is more costly.
- Labour market efficiency in Sweden is considered to be above the OECD average. An important challenge faced by the Swedish labour market is the integration of new migrants and asylum seekers.
- The quality of Swedish higher education and training system is considered above the OECD average, although enrolment rates in tertiary education have been declining.
- Agricultural education is mainly provided through vocational and higher education programmes. However, the interest for agricultural education is low and has been declining over recent years.

4.1. Infrastructure and rural development policy

Investments in physical and knowledge infrastructure, from ICT to transportation facilities, are necessary for overall growth and development. They are vital to the delivery of and access to essential services and play a critical role in linking farmers and related businesses to markets, reducing food waste, boosting agriculture productivity, and facilitating investment in innovative techniques and products.

Broader rural development measures also affect sustainable agricultural development and structural adjustment. Off-farm income and employment opportunities mitigate farm household income risks, facilitate farm investment, and enable a wider range of farm production choices. Improved rural services, from banking to ICT, and ensure needed connectivity to suppliers and customers. Rural policy can also attract innovative upstream and downstream industries, with possible positive spillover effects locally. By reducing imbalances in economic development and access to services across regions, rural development policies improve the diffusion of innovation (OECD, 2014a).

In Sweden, where the density of population is low and the population is concentrated in main southern urban centres, the provision of infrastructure and services presents specific challenges. In remote areas with sparse population, connecting people to markets and providing information and services requires innovative solutions.

Quality of physical infrastructure

According to the World Economic Forum's Global Competitiveness Report (WEF, 2017), the quality of transport infrastructure in Sweden is similar to the OECD average (Figure 4.1.A) and ranks 25th in the world. There are, however, important differences between means of transport. The quality of port infrastructure ranks highest (13th out of 138 countries), with quality similar to the OECD top 5 averages. High port quality is essential for a nation like Sweden where over 70% of foreign trade is transported using seagoing vessels (Transport Analysis, 2016). The quality of road transport and air transport is also considered above the OECD average, even though road quality and access from the most rural airports has been decreasing. However, the quality of rail infrastructure ranks the lowest (30th), below the OECD average.

The challenges facing the railway system concern its rapidly ageing infrastructure, its need for maintenance and investment, and its growing capacity deficiencies (Transport Analysis, 2011). However, in addressing these challenges the government is currently making major investments in infrastructure, road and railway maintenance, and public transport (OECD, 2017a).

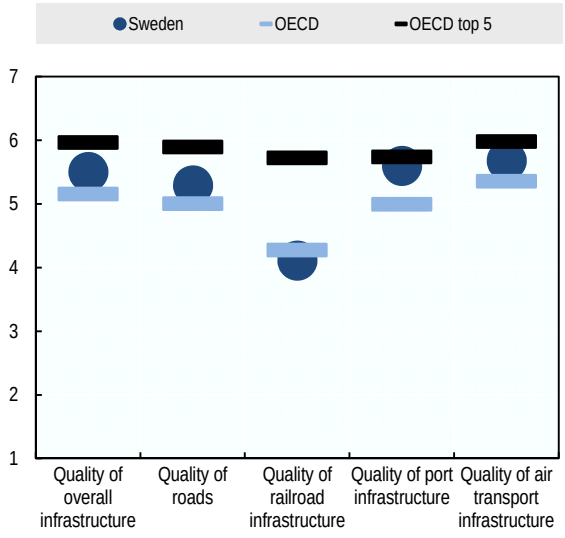
The main transport modes for agricultural products are road and rail with 64 million tonnes of products of agriculture, forestry and fishing transported by road in 2016 and 9 million tonnes by train (Transport Analysis, 2017a and 2017b). Therefore, good quality of road and railway infrastructure is essential for the development of the food and agriculture sector. But there is a need to improve the quality of transport infrastructure in rural areas and strengthen the connection with urban centres in order to maintain rural communities and increase their attractiveness (OECD, 2017a).

Regarding electricity and telephone infrastructure (Figure 4.1.B), Sweden scores significantly above the OECD average and ranks tenth out of 138 countries. This score is boosted by a very high quality of electricity supply, ranking fourth out of 138 countries and considered as one of the best among OECD countries. Regarding telephone infrastructure, the number of cellular telephone subscriptions is above the OECD average (1.3 per person in 2016) and has significantly increased since 2012 (first WEF survey). The number of fixed telephone lines is around the OECD average but has been falling, as most people have switched from fixed line to cell phones.

Figure 4.1. Global Competitiveness Index: Quality of infrastructure, 2016-17

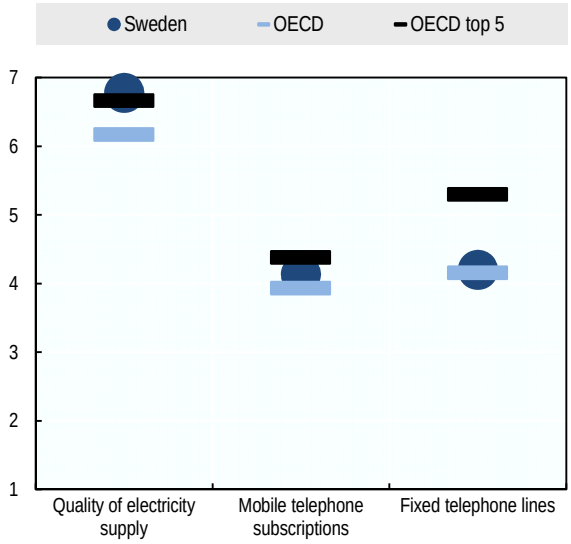
Scale 1 to 7 (best)

A. Transport infrastructure, by component



Note: OECD top 5 refers to the average of the scores for the top 5 performers among OECD countries (Netherlands, Japan, France, United States and Germany).

B. Electricity and telephony, by component



Note: OECD top 5 refers to the average of the scores for the top 5 performers among OECD countries (Switzerland, Luxembourg, Austria, United Kingdom and Japan).

Source: World Economic Forum (2017), *The Global Competitiveness Report 2016-2017: Full data Edition*, Geneva 2016, www.weforum.org/reports/the-global-competitiveness-report-2016-2017-1

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High-speed broadband is available in nearly every part of Sweden. Almost everyone in Sweden has access to the Internet (at least 10 Mbit/s). However, for fast broadband, accessibility varies between and within urban areas, smaller villages and sparsely populated areas. In rural areas, less than one in four households have access to 100 Mbit/s Internet, compared to almost three in four in urban areas. To improve access to high-speed broadband in remote and rural areas, the Government provides state aid for deployment of infrastructure in areas lacking commercial investments. Improving fast broadband internet services in remote areas would provide local farmers and agri-food companies with better access to information for inputs, technologies, advice, and consumers, allowing them to take better advantage of market opportunities.

Regarding agriculture-specific infrastructure, land improvement directly affects farm productivity and sustainability. According to a survey undertaken by the Swedish Board of Agriculture (SBA), nearly 80% of arable land in Sweden had satisfactory drainage system in 2016 and 47% of arable land had tile drainage. However, one fourth of arable land needed a new or refurbished drainage system (SBA, 2017).

Priorities and funding for infrastructure development

In Sweden, new infrastructure is generally funded by State grants. However, co-funding from counties, municipalities, companies, the European Union and user fees or congestion tax is also provided. Investments in broadband infrastructure is also co-founded by individuals. There is no specific provision or focus on the agricultural and food sectors. Infrastructure development plans aim to respond to identified needs such as improvement in rail and road infrastructure, high-speed broadband access for all and an entirely renewable electricity system.

State ownership is still a prominent feature for most road and railroad infrastructure in Sweden. Over 80% of electricity production in Sweden relies on hydro power and nuclear power, and there is important investment to expand renewable electricity production (hydropower, biomass-based electricity, wind power, and solar power).[1] New telecom infrastructure is mainly provided and funded by commercial actors.

Water supply and sewage disposal are a municipal responsibility. The three most important laws regulating urban water supply and sewage disposal are: the Public Water and Wastewater Plant Act (WWA), the Environmental Code and the Food Act. The WWA law articulates that water charges are not to exceed necessary costs to provide the services, and that charges can only be used within the water sector. Today, all large Swedish municipalities cover their costs for water and wastewater services solely through water charges (Lannerstad, 2002).

For agriculture the supply of water is generally not a problem, neither concerning quantity or quality. Irrigated areas represented only 1.7% of the Swedish utilised agricultural area, 18% less than in 2010. Access to water for agriculture and land drainage is regulated by the Environmental Code. Permission is required for extracting irrigation water, where each case is considered by one of the five regional land and environmental courts. Regarding land drainage, a permit is needed and might be denied if it is considered to affect wetland conservation.

Regional policy

Sweden's approach to regional development policy has continuously evolved since the 1950s, without losing its focus on promoting equity between regions. The latest strategy, the National Strategy for Sustainable Regional Growth and Attractiveness 2015-20, establishes four national-level priorities for promoting sustainable regional growth:

- innovation and business development
- attractive environments and accessibility
- provision of skills and competence
- international co-operation.

While the priorities themselves are similar to those of the previous programming period, there has been a shift in focus within the priority areas. Overall, the concentration is now more on business development than business creation; spatial planning and housing; more fully integrating and activating its labour force, including immigrants; and furthering cross-border collaboration. There is also added emphasis on implementation and results through dialogue processes, learning and knowledge exchange (OECD, 2017b).

Sub-national government agencies also have an important role in fostering regional development with more than ten County Councils now in charge of regional development. Since 2010, Sweden also has strengthened co-ordination across levels of government for regional development policy. This has occurred mainly through two instruments: i) the new national strategy for sustainable regional growth and attractiveness 2015-20 and regional development strategies at the county level, which are intended to align with the overall national strategy; and ii) a stronger role for the government's forum on sustainable regional growth and attractiveness 2015-20. Created in 2007, this forum is used to promote dialogue and co-ordination between levels of government and type of government actor (political and civil service), bringing together representatives from ministries and regional bodies.

Rural development

Overview of rural and sparsely populated areas

The industrialisation of the economy over time has resulted in a relocation of population from rural to urban areas, and is the main cause of the stagnation of rural areas in Sweden. At present, close to 50% of the Swedish population is living in the three biggest cities of the country: Stockholm, Gothenburg and Malmö.

Rural areas in Sweden face similar challenges and dynamics to other OECD countries. Together with a faster growth of an ageing population commonly found in all OECD economies, Sweden as a relatively small economy faces more sensitivity to exogenous shocks, and the greater role of the tradable sector in economic performance. However, there is significant diversity in Sweden's rural landscape, with a densely populated south and less densely populated north where the population is concentrated in coastal areas. Those places exhibit different demographic and economic trends. In recent years, the North has generally performed better due to its natural-resource-based industries (OECD, 2017b).

Another important challenge faced by rural and sparsely populated areas in Sweden – as in many other OECD countries – is the accessibility to basic services. Declining population in some remote parts of the country has led to a decrease in the number of grocery shops, fuels stations and pharmacies.[2] Access to health, postal and payment services has also been decreasing. The government has committed to an increase in spending by SEK 36 million per year for the provision of basic services in these areas. The development of e-services could also be part of the solution, mainly for health care and grocery shops.

Swedish rural development framework

Historically, Sweden's approach to rural development has been based on providing sectoral support for agriculture, and state aid for businesses located in sparsely populated areas. With accession to the European Union in 1995, Sweden also adopted the Common Agricultural Policy (CAP), which included implementing a Rural Development Programme (RDP).

The RDP has a strong focus on agriculture and its link to the broader rural economy through improvements to environmental goods and services, and the development of a low carbon economy (Chapter 5). Only a small part of the total RDP budget (20%) is allocated to broader goals such as social inclusion, poverty reduction, economic development and access to services. This is problematic for northern counties where farming plays a far smaller role in the economy and in land use than in the south.

Sweden lacks a coherent national rural policy, and existing programmes and investment are not effectively mobilised to improve wellbeing and promote growth in rural areas (OECD, 2017b). There is no clear framework or mechanism to adapt policies delivered through sectoral ministries to the needs and circumstances of rural places. The governance and funding arrangements for the RDP also differ from regional growth policy in many regions. This separation reduces opportunities to co-ordinate investments delivered through the regional growth policy and the RDP at the regional level.

Toward a renewed rural development policy

In 2015, the government established a Parliamentary Committee to provide a blueprint for the future of rural policy in Sweden. The Committee's mandate was to identify policies to improve the conditions for growth in rural areas and highlight the current issues, and future challenges and opportunities for different types of rural areas.

In January 2017, the Committee delivered its final report: "For Sweden's rural areas – A coherent policy for work, sustainable growth and welfare" (SOU, 2017). The overall aim was to present a

coherent rural development policy for the following 30 years. The main objectives, examples of proposals and the estimated cost of the new rural policy are summarised in Box 4.1.

Box 4.1. Objectives, proposals and costs of the new rural policy

Objective 1: **Create a diversified, competitive and sustainable business community with good capacity for renewal**

- Reinforce the mandates of Almi Företagspartner AB, Saminvest AB and Vinnova to work for business development in very sparsely populated rural areas.
- Expand support for innovation groups and innovation networking within the remit of the RDP.
- Task regional export centres and Visit Sweden to carry out targeted initiatives for companies in rural areas in order to strengthen their export performance.
- Establish a new research centre in order to foster knowledge development about the conditions under which rural enterprises operate.

In addition, the Committee proposes to introduce a "*Business package*" in municipalities facing particularly tough challenges. It would concern 23 rural municipalities in local labour market regions where populations are small but cover a large geographical area. The aim of the package is to increase access to labour and free up capital for local businesses.

Objective 2: **Provide opportunities of digitalisation that benefit the whole country and infrastructure that guarantees passenger and goods transport to citizen and businesses in rural areas**

- Set a new objective for broadband expansion: access to digital infrastructure with transfer capacity of at least 100 Mbit/s for the whole country by 2025.
- Commission the SBA to shape broadband support within the 2021–27 RDP.
- Assess the consequences that a change in taxation, charges and deductions in the area of transport policy would have on the opportunities for achieving the objectives of rural development policy.
- Launch an overview of the travel deduction system with the aim of making it based on distance.

Objective 3: **Ensure that the educational system provides skills and increases access to higher education throughout the country**

- Offer higher education locally in partnership with municipalities in "education centres".
- Investigate the effects and consequences of writing off a proportion of student loans of those who live and work in the 23 municipalities facing tough challenges.

Objective 4: **Develop planning and housing policy that meets the needs of rural areas**

- Commission the National Board of Housing, Building and Planning to draw up guidance for how rural values and development opportunities can be accounted for within the framework of municipal land-use planning.
- Reduce certain restrictions that apply to building and development in rural areas.
- Investigate whether building can be facilitated by introducing special rural loans for self-builders, rentals, owned apartments, cooperative tenancies and tenant-ownership.

Objective 5: **Improve access to services, welfare and the arts in rural areas**

- Safeguard access to post office and payment services.
- Adapt the system that ensures equal financial conditions in municipalities to demographic changes and other circumstances and make earmarked government grants more general.

Objective 6: **Increase the presence of the State in rural areas jobs, government agency services and police force**

- Stop planned cuts in the Swedish employment service's local office network until the consequences of the cuts and the introduction of alternative digital channels for job seekers have been evaluated.
- Set up a service organisation tasked with responsibility for local services that are currently performed by the Swedish social security agency Försäkringskassan, the Swedish Tax Agency and the Swedish Pensions Agency.
- Relocate 10 000 posts at government agencies in Stockholm's Functional Analysis (FA) region to FA regions in need of public sector employment for a five-year period.

Objective 7: **Clearer steering and co-ordination of rural development policy**

- Assess and outline the consequences of Committee reports and Government decisions for rural areas.
- Set up a strategic and operative coordination function in each county, known as "rural delegation".

Objective 8: **Encourage better conditions for civil society to contribute towards rural development**

- Expand the *Liaison entre actions de développement de l'économie rurale* (Leader) method nationwide and expand the State's agreement with civil society at national level by also focusing on developing working methods for rural development.
- Strengthen targeted support for non-formal adult education, in particular, the opportunities and capacity of young people and people with an immigrant background to participate in rural development.

Regarding costs, education centres in FA regions incur an estimated annual cost of SEK 70 million. The cost of the Committee's proposal for broadband expansion is estimated at approximately SEK 2 billion. The Committee's proposal to carry out locally-led development using the Leader method nationwide is estimated to cost a further SEK 150 million over a seven-year period. Finally, SEK 500 million is needed for growth enhancing measures in the package targeting the 23 municipalities facing particularly tough challenges.

Source: SOU (2017), För Sveriges landsbygder – en sammanhållen politik för arbete, hållbar tillväxt och välfärd.

4.2. Labour market policy

Labour market policy influences employment composition and labour mobility, in particular by facilitating (or discouraging) labour to adapt to new circumstances. It can play an important role in facilitating structural adjustment, including farm consolidation, by assisting excess labour in farming to exploit more remunerative non-farm income and employment opportunities. Policies to improve skills and the international mobility of human resources can also help to better match labour supply with demand, and can affect innovation and knowledge transfer through exchange of skills and skilled labour. Structural adjustment allowing younger and better-educated farmers to enter the sector, and skills improvement policies are expected to improve the adoption of sustainable practices (OECD, 2014a).

Labour market legislation

Swedish and Nordic labour laws are largely based on collective agreements. Sweden has no minimum wage, but instead has a well-established structure of collective agreements that set a "reasonable" minimum wage. These labour laws are mainly the result of initiatives from the Swedish Trade Union Confederation in the early 1970s and a number of laws were put in place, such as the Employment Act, the Act on Employment Protection and the Representatives Act. These laws are applied to all sectors, and agriculture is generally not considered as a specific case. Collective agreements are not compulsory by law, but the coverage rate is very high. In 2015, about 85% of all employees in the private sector were covered by collective agreements while the corresponding figure for the public sector is 100% (Kjellberg, 2017).

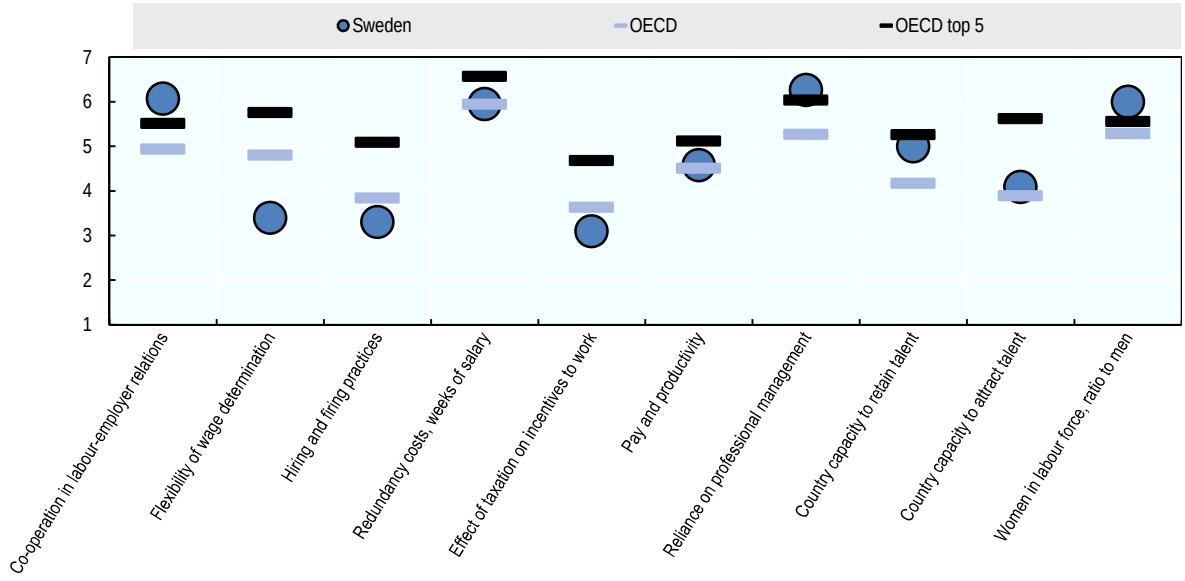
According to the WEF Global Competitiveness Index, which is based on an executive opinion survey, labour efficiency in Sweden is above the OECD average and ranks 18th out of 138 countries. However, this overall evaluation hides differences in performance by components of labour market efficiency (Figure 4.2). Regarding labour flexibility, Sweden scores below the OECD average for most of the indicators; namely: flexibility of wage determination, hiring and firing process and the effect of taxation on incentives to work. However, the protection of temporary forms of employment is significantly lower than the OECD average and is one of the most flexible among OECD countries. Flexible regulation on temporary forms of employment facilitates the use of seasonal labour, which is much needed in agriculture. In Sweden, about 45% of annual working units in agriculture are seasonal employees (SBA, 2016a).

Restrictive labour regulation is perceived as the second most problematic factor for doing business (Chapter 3). Only the co-operation in labour-employer relation is considered very high. Sweden is doing much better in terms of "Efficient use of talent" with a score above the OECD top 5 average for

reliance on professional management and female participation in the labour force. Pay and productivity and the country capacity to attract talent are in line with the OECD average.

Figure 4.2. Global Competitiveness Index: Labour market efficiency, 2016-17

Scale 1 to 7 (best)



Note: OECD top 5 refers to the average of the scores for the top 5 performers among OECD countries (Switzerland, United States, United Kingdom, New Zealand and Canada).
Source: World Economic Forum (2017), *The Global Competitiveness Report 2016-2017: Full data Edition*, Geneva 2016. https://www.weforum.org/reports/the-global-competitiveness-report-2016-2017-1.

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Initiatives to create new jobs and assist labour adjustment

An important challenge faced by the Swedish labour market – which is important for rural areas and activities – is the integration of new migrants and asylum seekers. In 2015, Sweden had the highest per capita influx of asylum seekers ever recorded in an OECD country, and the share of foreign born persons in Sweden more than doubled from 7.5% in 1980 to 16% in 2015 (OECD, 2016a). The problem is that most of the early migrants have a low level of education and literacy proficiency. The unemployment rate of foreign born persons has thus been much higher than for native Swedes and has been increasing, mainly reflecting a gap between native and migrant skills. However, the government has already taken some steps in order to tackle this issue.

The Swedish policy response to increase the employability of low-skilled migrants has so far mainly been a mix of two broad policy tools: upskilling and enhancing transparency on migrants' skills on the one hand, and temporarily lowering the cost of hiring through wage subsidies on the other. Swedish tuition for immigrants has recently been made more flexible and more resources have been allocated to improve the recognition of foreign qualifications. Furthermore, the government intends to broaden newly arrived migrants' access to training and vocational introduction employment[3] (OECD, 2016a).

In the Budget Bill for 2017, the Government will invest in an active labour market policy for increased employment, strengthen the supply of skills, and improve unemployment insurance for part-time unemployed people. The Government is also intensifying efforts to better enable new arrivals to quickly become established in working and community life. More investments will be made for asylum seekers and increased resources for the introduction programme.[4] The Government also

intends to introduce a new compensation system for the reception of un-accompanied minors and young people (GOS, 2017).

Labour supply in rural areas

Relative to urban and intermediate regions, rural areas generally have a smaller working age population compared to a growing share of the population aged over 65 and less than 15. Despite recent growth in population there is a long-term trend of ageing and a shrinking workforce which has result in shortages of workers in many rural places. In addition, young people (and especially skilled ones) tend to leave and go to cities where most higher education is provided and where employment in services is increasing, and only a few of them return. This reduces the number of skilled workers available for local businesses and makes it difficult to attract knowledge intensive businesses to rural areas.

There is an on-going discussion on whether the agricultural sector and rural areas can be part of the integration of immigrants in Sweden. This would at the same time reduce labour shortages in the agricultural industry, enable low-skilled new comers to be integrated into the labour market, and modify the age structure of rural areas. The proportion of immigrants in the agricultural sector has already increased for all sub-sectors in the industry since 2007. The growing of perennial crops is the industry with the highest proportion of immigrants (25%), while the lowest proportions are found in animal production, mixed farming and the agricultural support industry.

Currently, there are few initiatives for the integration of migrants into the agricultural sector. Existing initiatives are mostly operated in the private sector, and partly publicly financed. These projects attempt to combine the challenges relating to integration, rural competence provision and generation change. One such project is *Grön Integration* (Green Integration), initiated by the Rural Economy and Agricultural Societies.

The government has provided incentives to promote employment in the green industries for newly arrived individuals (The Swedish Forest Agency, 2017). In 2016, it commissioned The Swedish Forest Agency, The Swedish University of Agricultural Sciences, and Sweden's Public Employment Agency to identify potential solutions in order to increase attractiveness and accessibility to the green industry. SOU (2015) and the Food Strategy (GOS, 2015) emphasise that the adjustment speed and adjustment opportunities are insufficient, within both agriculture and the food sector. Increasing entry into the sector and more flexible labour market from both demand and supply perspective should be encouraged. The Food Strategy also points out the importance of these new ways of adjustments at a time of high migration and need for integration.

4.3. Education and skills policy

Education policy affects innovation in at least three ways: a high level of general and scientific education facilitates acceptance of technological innovation by society; well-educated researchers, teachers, extension officers, and producers are needed to develop relevant innovations; and farmers and business operators with higher education and skills are better able to adopt technological innovations. Continuous skills development (training, re-training) is thus essential to improve the matching of skills demand in evolving food and agriculture sectors, which need to adopt productivity and environmentally enhancing technologies and practices (OECD, 2014a).

The general education system

Governance and funding

The Swedish educational system includes primary school education (compulsory school), upper secondary education, university/college education and higher vocational education studies. Municipal

adult education, preparatory courses and folk high schools provide opportunities for adults with upper secondary education to complement their studies with theoretical or practical classes, and be able to enter university or higher vocational education programmes.

The education system is a municipal and state responsibility. Compulsory school and upper secondary level, including adult studies at upper secondary level, are a municipal responsibility. Overall guidance such as course contents, regulations and grades are decided by the state, but the implementation and financing lie with the municipalities.

Sweden's decentralised educational system, where municipalities and Swedish National Agency for Higher Vocational Education decide what vocational education programmes are offered, gives schools a high level of autonomy. In contrast to the majority of OECD countries, the authority to determine teachers' base salaries and award additional payments rests at the local level with the School Board or the Head Principal of schools. Although the total working time per year is statutory, school leaders decide on the number of working hours per week and on the use of teachers with regard to teaching and non-teaching activities (OECD, 2015).

In Sweden, teachers' salary scales are compressed and lag for those starting in their careers, both compared to the OECD and EU-22 averages of teacher salaries, as well as workers with the same level of educational attainment within the country. Despite a flat salary scale, Sweden has among the highest statutory working hours per school year (OECD, 2016a). This has led to a shortage of qualified teachers across the country, reflecting the low attractiveness of the teaching profession in Sweden.

At university level, the responsibility lies entirely with the State. Most major educational institutions are controlled and financed by the Ministry of Education and Research. The Swedish University of Agricultural Sciences is an exception, and comes under the Ministry of Enterprise and Innovation in charge of agriculture-related matters. Universities have a great deal of freedom, and can largely decide for themselves – within the framework of their assignment – what studies to provide. The education system is generally free for students. Two exceptions are higher vocational education studies and, for non-EU students, higher education for which fees are levied.

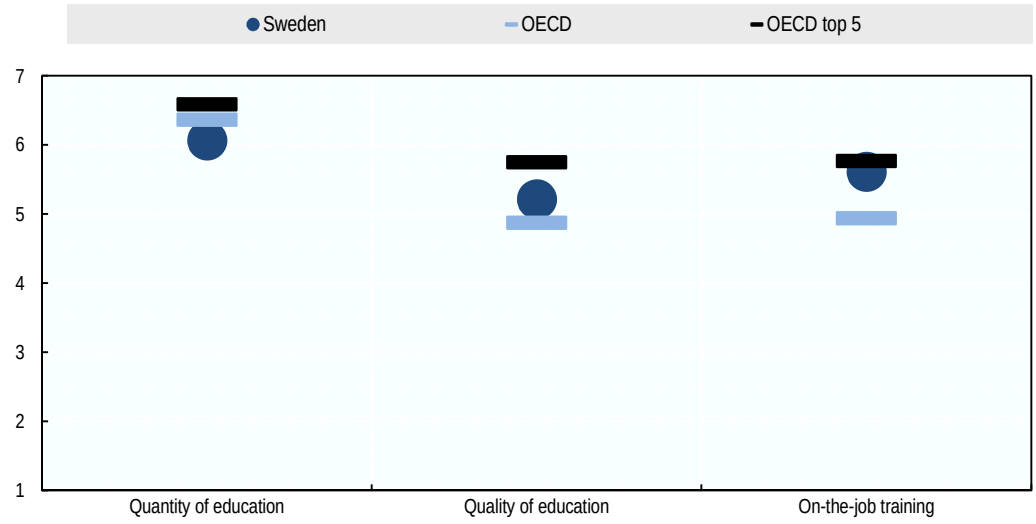
Overall performance

Business leaders rank Sweden above the OECD average in terms of the *quality* of higher education and on-the-job training (WEF, 2017) (Figure 4.3). The quality of higher education, reflecting business executives' assessment of how well the educational system meets the needs of a competitive economy, is considered above OECD average, despite a relatively low quality of maths and science education. Regarding on the job training, Sweden compares with the OECD top 5 average and ranks 7th in the world. Provision of on-the-job training, is measured by the availability of high-quality, specialised training services and the extent to which companies invest in training and employee development.

However, the *quantity* of higher education, as measured by an index of secondary and tertiary enrolment rates, scores below the OECD average and ranks 43th in the world. This score is affected by a low and decreasing gross enrolment rate in tertiary education compared to the OECD average. If current patterns of entry continue, it is estimated that 62% of young adults in Sweden will enter tertiary education at least once during their lifetime, compared to the OECD average of 68%. However, the share of the population that have attained tertiary education is above the OECD average (40% against 36%) (OECD, 2016a). Incentives to pursue higher education might be lower in Sweden due to homogeneous employment rates among educational attainment levels and the low earnings advantage of tertiary education. The earnings advantage of a tertiary education in Sweden is the smallest among OECD countries.

Figure 4.3. Global Competitiveness Index: Higher education and training, 2016-17

Scale 1 to 7 (best)



OECD top 5 refers to the average of the scores for the top 5 performers among OECD countries (Finland, Netherlands, Switzerland, Belgium and Denmark).

The quantity of education index is based on secondary and tertiary education enrolment rates from UNESCO Institute for Statistics. The quality of education index is based on responses from a WEF Executive Opinion Survey on "How well does the educational system meet the needs of a competitive economy; Executives' assessment of the quality of math and science education in schools and the quality of business schools; and on how widespread is Internet access in schools. The on-the-job-training index is based on survey responses on the availability of high-quality, specialised training services and the extent to which companies invest in training and employee development.

Source: World Economic Forum (2017), *The Global Competitiveness Report 2016-2017: Full data Edition*, Geneva 2016. https://www.weforum.org/reports/the-global-competitiveness-report-2016-2017-1.

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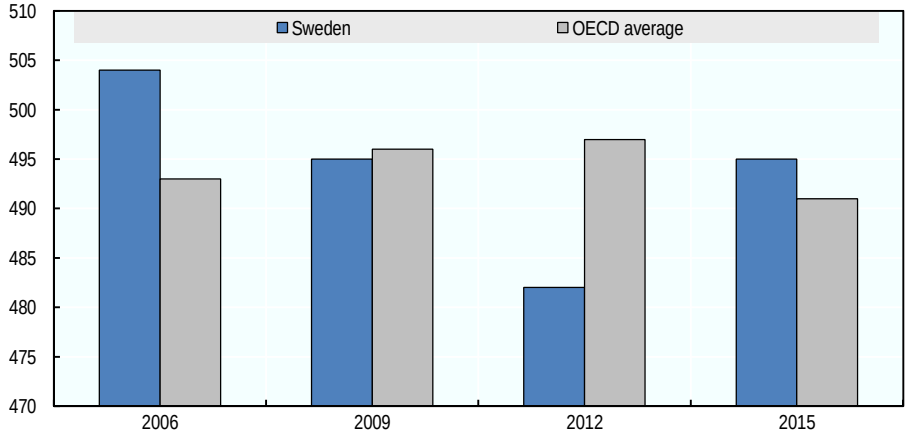
According to the OECD Programme for International Student Assessment (PISA), the earlier trend of declining learning outcomes in Sweden for the past decade has been reversed since 2012 (Figure 4.4). In 2015, the score of Swedish 15 years-old students in sciences was similar to the OECD average and the scores in mathematics and reading were above the OECD average[5] (OECD, 2016b). However, the impact of socio-economic status on students' performance has increased. Variation between schools seems to be driven mainly by residential segregation and to a limited extent by the introduction of school choice and independent schools in the 1990s (OECD, 2017a). Finally, Sweden (as is the case in many other OECD countries) is still struggling to close the performance gap between native and immigrants students.

According to the OECD Programme for the International Assessment of Adult Competencies (PIAAC) survey, Swedish adults (16-65 years) performed significantly above the OECD average in literacy and numeracy, and in terms of problem solving in technology-rich environments[6] (OECD, 2016c). In particular, about three-quarters of the adult population in Sweden display moderate to good skills and readiness to use ICT for problem solving, together with New Zealand the highest proportion among surveyed countries. For all three categories, young adults (16-32 years) scored better than their older counterparts (55-65 years).

Figure 4.4. Mean PISA score (maths, science, reading) Sweden and OECD average (2006-20015



Source: OECD PISA.

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Trends in education expenditures

While students and adult skills are well-above the OECD average, expenditure on education as a percentage of GDP (5.4%) is close to the OECD average (5.2%). Its level of expenditure per student (for core services, ancillary services and research and development) is among the highest across OECD countries at USD 13 072 per student per year for primary to tertiary education, above the OECD average of USD 10 493. Sweden is also one of the two OECD countries (with Norway) which funds 100% of primary, secondary and post-secondary non-tertiary institutions from public sources, compared with the OECD average of 91.3% (OECD, 2016a).

Current policy efforts

The Government has already taken some steps in order to face the different challenges encountered by the Swedish educational system. Education received an additional SEK 8.3 billion (about 0.2% of GDP) in 2016 to enhance the attractiveness of the teaching profession, notably through salary increases, and to promote early intervention and equity. Special resources have been channelled to schools with low learning outcomes. Measures are also being taken to enable teachers to devote a larger proportion of their working hours to teaching (OECD, 2017a).

Agricultural education

Agriculture-related education programmes

Agricultural education is available in Sweden both through higher education and vocational education programmes. The main vocational programmes that are adapted for working within the food chain are the natural resources use programme and the food programme. In 2010, the food programme was merged with restaurant education and has become the "restaurant management and food'' programme. There are four elements in the national natural resources use programme: animals (pets), agriculture, forestry, and gardens; and three in the restaurant management and food programme: kitchen and serving, baking and patisserie, fresh foods, delicatessen, and catering.

There are several higher vocational programmes within agriculture, horticultural production and food processing. The Swedish National Agency for Higher Vocational Education authorises various education providers to offer specific programmes following an application process. Those who apply to offer a particular programme must demonstrate that there is market demand for the programme's

qualifications, and that students can expect to find a job after completing their studies. Higher vocational education courses usually correspond to at least one year and maximum three years of full-time studies-often including a work placement- and end up with a qualification.

The Swedish University of Agricultural Sciences (SLU)[7] is the institution responsible for agricultural higher education and research. The university is composed of four faculties: Landscape Planning, Horticulture and Crop Production Science; Natural Resources and Agricultural Sciences; Veterinary Medicine and Animal Science; and Forest Sciences. In particular, SLU offers Bachelor's and professionals programmes in agronomy, food, and horticultural management and Master's programmes in agricultural economics and management; agricultural, food and environmental policy; agroecology and plant biology. Students from SLU contribute to agriculture in Sweden in the form of officials, advisors, and trainers but they have fewer opportunities to work directly within agricultural businesses, which increasingly demand high-skilled workers with practical knowledge.

Food programmes specialising in industry are offered by Lund University's Faculty of Engineering in the form of its Food Technology programme, and they are in high demand thanks to their attractive combination of theoretical and practical skills. Admission for 30 places takes place every year. Lund University's Faculty of Engineering and Chalmers University of Technology also have a number of students who specialise in food technology towards the end of their engineering programmes, but they are few in number, according to the Swedish Food Federation. There are other food-related programmes at several Swedish universities, such as programmes in nutrition and dietary economics. However, few students from these programmes end up working in the industry, although they are often find jobs in education.

The career path of graduates from any agriculture and food related higher education institution has evolved over time. The share of graduates in any agriculture-related higher education ending up working in education and public administration increased between 2003 and 2013 and education is now the second largest sector employing higher-education agricultural graduates. They have also tended to spread out in more sectors, some of them being unrelated to the food industry (transport, chemistry, and computer science for instance) (SBA, 2016a). This has been possible as these programmes offer skills that can be easily transferred to other sectors.

There are few options available for agricultural or horticultural entrepreneurs or food producers who want to continue building on their skills. Continuation courses are sometimes arranged by farmers' own organisations such as the Rural Economy and Agricultural Societies or the Federation of Swedish Farmers. They are financed by the participants themselves, often with support from the County Administrative Board or the SBA. Employers can also pay for their employees' further education via commissioned education. SLU offers some courses within food and agriculture/horticulture such as online learning within the framework of MENY, a system for web-based commissioned courses.

Vocational training programmes are arranged by the Swedish Public Employment service in certain occupations with a shortage of workers. There are currently a number of programmes that benefit the food industry, such as training of slaughterers and butchers, and there are plans for a training programme for dairymen. There are also some training programmes in agriculture and horticulture. These courses are usually aimed at the long-term unemployed and new arrivals, normally at first-cycle level.

Agriculture enrolment trends

Upper secondary school programmes were reformed in 2011, distinguishing more clearly between vocational programmes and university entrance programmes. In two years, between 2010 and 2012, the number of students starting the natural resources use programme decreased by over 30% (Figure 4.5). During the same period, all vocational programmes together lost over 28% of their applicants, who instead applied to study more theoretical programmes. Since then, the number of students starting the natural resource use programme has slightly decreased, reaching 3000 in 2016.

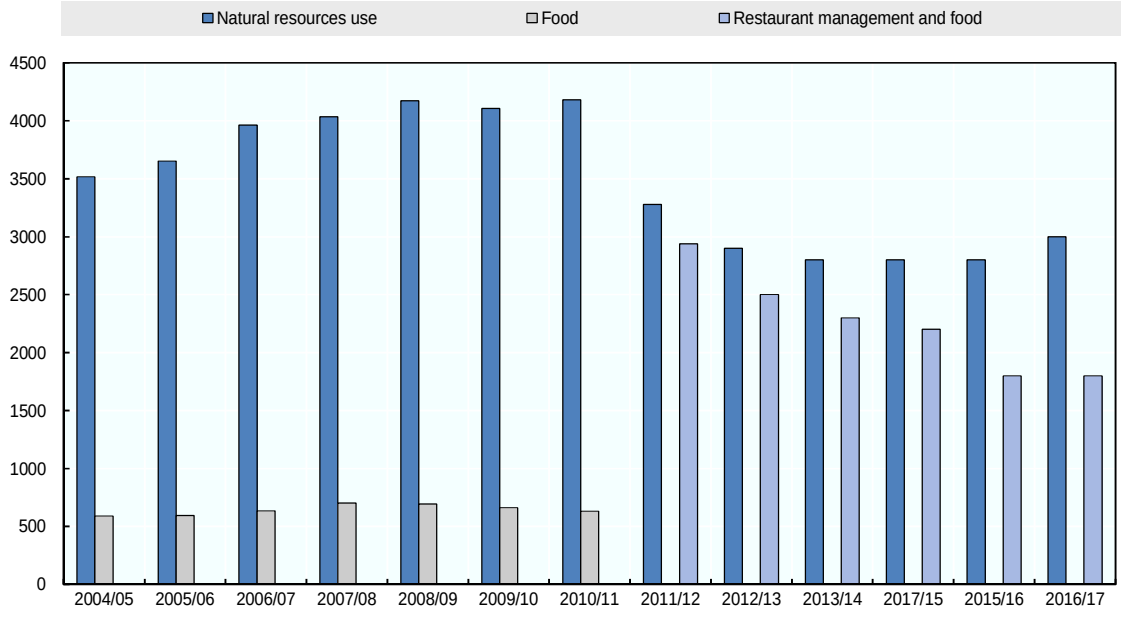
As the food programme merged with restaurant education, it is difficult to see and compare how the number of pupils with a food specialisation has evolved over time. Vocational programmes are not very popular among parents as there are few opportunities to go to university afterwards.

Regarding the number of students in the different branches of the natural resources use programme, animals (pets) is the largest – but is also the one that is the least related to the agricultural sector. Agriculture and Forestry are smaller but the number of students has been stable during recent years, representing around 500 new students per year for agriculture. The programme on "Gardens" is the smallest one and the number of students is on a declining trend (Figure 4.6).

In March 2017, the Government presented a bill that aims to increase vocational education in the country. The Government notes that interest in vocational education has decreased and that there might be up to 100 000 fewer vocational students by 2025. The goal is to establish closer ties between agri-food industries and the municipal schools. Currently, there is no control within upper secondary education over the number of places within the various programmes based on the needs of the labour market.

The total number of students enrolled at SLU decreased by 5% between 2013 and 2016. The biggest decrease is at the doctorate level (-16%). The number of newly registered students in programmes related to agriculture and food has been quite constant for the period 2013-15 with an average of 522 students, but it decreased to 422 in 2016.[8] According to SLU, the decline in the number of full-time equivalent (FTE) students over the last five years is mainly due to a reduction in government grants for the period 2012-15. The Government has set a three-year FTE target for SLU (2016-18). In order to reach this target, SLU will have to increase the number of FTE students by 10% in the next two years.

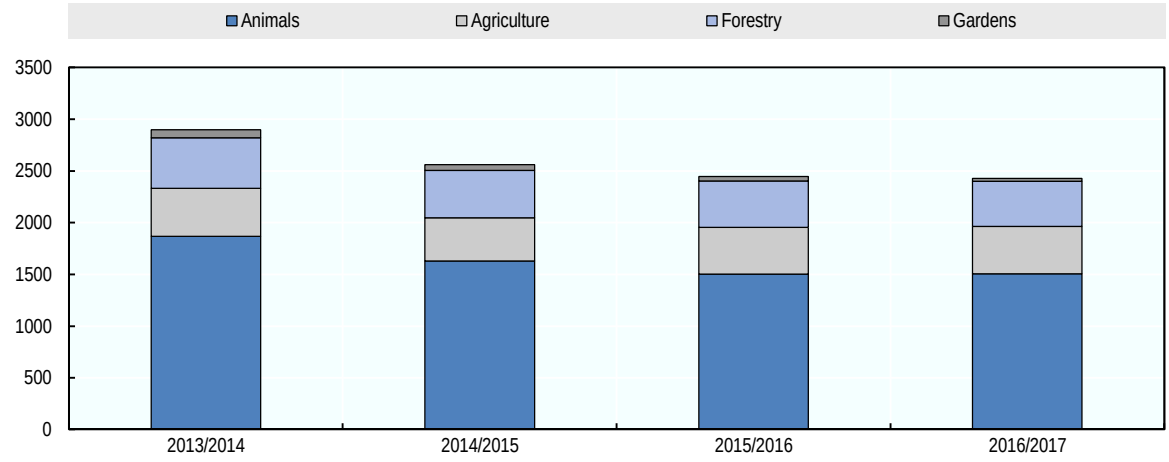
Figure 4.5. Number of pupils (1st grade) in upper secondary school in the natural resources use programme and the restaurant management and food programme



Source: Swedish National Agency for Education.

StatLink http://dx.doi.org/10.1787/888933710002

Figure 4.6. Number of students in the natural resources use programme by orientation, grade 3

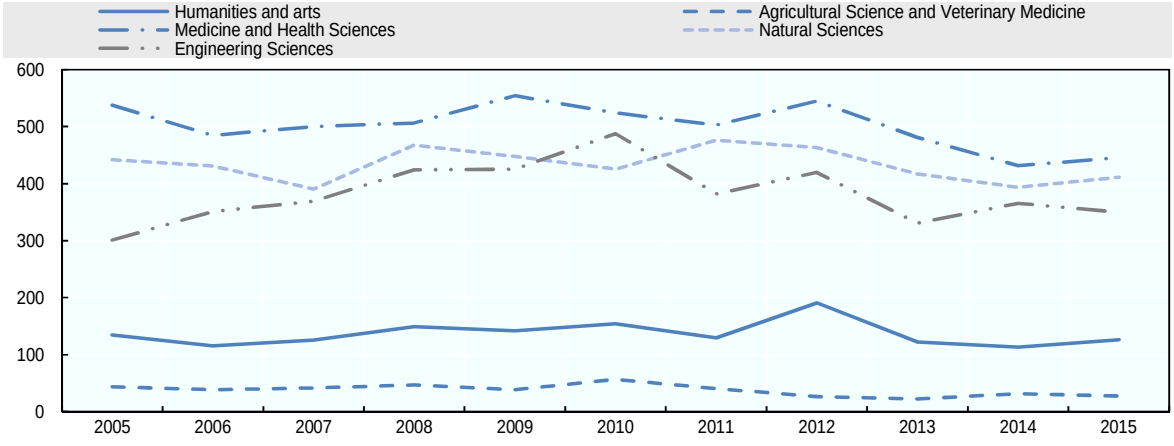


Source: Swedish National Agency for Education.

StatLink http://dx.doi.org/10.1787/888933710021

Regarding post-graduate studies, agricultural sciences and veterinary medicine is the research area with the lower number of new students in Sweden, although it has been quite constant since 2005 (Figure 4.7). Another issue lies in the fact that half of the agricultural PhD students are foreign students, so the future of the agricultural innovation system will depend on them staying in Sweden. The food industry is also experiencing a serious shortage of research according to the Swedish Food Federation. Researchers in food are few, partly since there are few graduate students. Applied research is no longer the priority, which might result in the poorer long-term development of the industry (SBA, 2016b).

Figure 4.7. New post-graduate students by research area



Source: Swedish National Agency for Education.

StatLink http://dx.doi.org/10.1787/888933710040

Meeting labour market needs in the food and agriculture sector

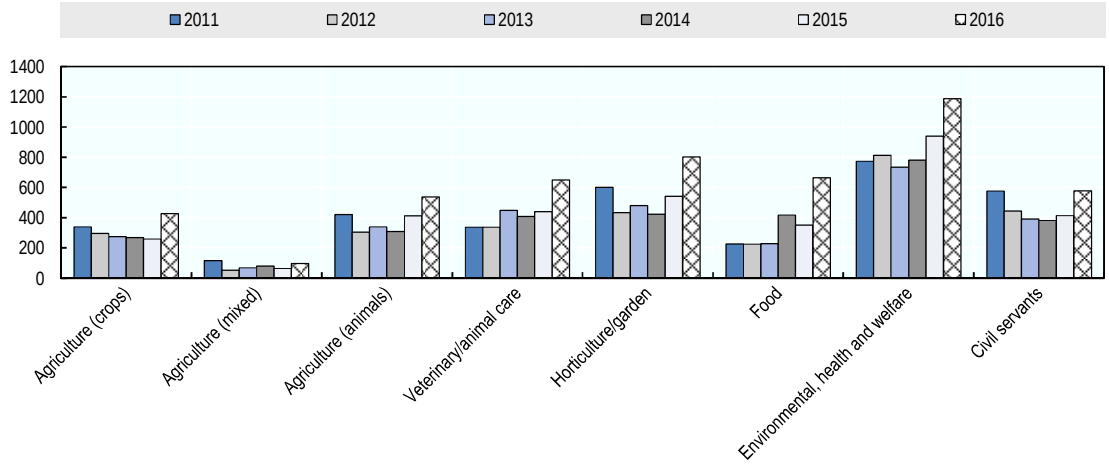
Vocational schools and higher education institutions have difficulties attracting enough students to meet labour market expectations. The Federation of Swedish Forestry and Agricultural Employers describes major problems for its members in finding skilled workers at all levels. The greatest needs are for animal handlers, tractor drivers and management. Within the horticultural sector, there are shortages in all areas. Additionally, monitoring shortages in the supply of workers has proven to be difficult, leaving little room for the authorities to take action (Box 4.2). This suggests that there are market failures, related to lack of information and/or poor remuneration and conditions in the food and agriculture sector.

Box 4.2. Difficulties in assessing the demand for agri-food workers

Shortages of workers in the agricultural sector have not been well monitored by the authorities. This is due to the fact that the agricultural industry – which consists of many small businesses – has taken different approaches to look for staff, so the Swedish Public Employment Service has not always registered the need for workers. The authorities have interpreted this as meaning that there is no shortage, and very few educational and training programmes have been arranged as a consequence.

The industry is now trying to provide information about its needs on a regular basis, and the Federation of Swedish Farmers has its own website for "green jobs", which currently includes 654 adverts for 1 266 job vacancies, many of them within horticulture (Figure 4.8). The authorities have become more sensitive to these needs in recent years, but there is still a shortage of programmes and workers within several areas.

Figure 4.8. Number of job vacancies advertised on gronajobb.se (2011-16)



Source: The Federation of Swedish Farmers.

StatLink http://dx.doi.org/10.1787/888933710059

A significant shortage for larger agricultural businesses is for management and supervisory positions that require both theoretical and practical skills. Many of these positions are currently filled by foreign workers. The larger units are also looking for specialised workers with new skills within fields such as biotechnology. Larger businesses need to focus more on customer demands in the market place, which has increased the need for entrepreneurial skills in both horticulture and farming.

Similar labour market experiences can be found in the post-farm gate stage of the agri-food chain. According to the Swedish Food Federation, the educational system is not meeting the labour needs of the food industry.[9] Few young people apply for jobs in food production, and this is true for both industrial and artisan work. There is a particularly significant shortage of labour in the meat and cured

meats sectors. Industrial developments are heading towards greater automation and a higher level of technology, which also places new and higher demands on staff.

Both the advisory industry and the education sector within the food chain lack qualified staff with both practical and theoretical knowledge. Advisors need to be trained to assist more competent business owners both with farming and breeding and with processing as a whole. Within the education system, young people should be given a sound education in both practical and theoretical elements by qualified teachers. *Naturbruksskolornas Förening*, which organises most of the natural resources sector schools in the country, has noted an increasing problem for many schools in finding qualified and competent teachers.

One possible explanation for the low interest in agricultural studies and the shortage of workers along the food chain are low wages in the food and agriculture sector. In 2016, berry pickers and planters, mixed crop and animal breeders and livestock and dairy producers were part of the 20 occupations with the lowest average monthly wage in Sweden (Statistics Sweden, 2017). Wages in food processing are also low, and currently below the average monthly wage across all occupations.[10] Additionally, agriculture is facing competition from other sectors, in particular forestry and mining, which offer better wages and working condition. Students with vocational education on agriculture easily find jobs in the sector, but they tend to quit for easier and better paid opportunities. Lack of focus on productivity and economic performance could also play a role in the sector's low wages.

Another possible explanation lies in the fact that agricultural jobs might not be very attractive for young people as many of the employers are located in rural areas. Sweden shows a high degree of "urbanisation of knowledge" (i.e. highly educated people tend to live in urban areas) and this pattern also holds for knowledge in agriculture. Graduates with food and agricultural education tend to locate within or close to more urban, denser places. This might be problematic since agricultural knowledge is somewhat related to an industry which is tied to rural areas as a result of locational-specific natural resources (SBA, 2016a).

Science and environment awareness in education and society

Science

Only 0.9% of Swedish students are not required to attend formal science courses, against the OECD average of 6.4%. The quality of science education, reflected by PISA scores, has improved since 2012 and compares with the OECD average, after some years of declining learning outcomes (OECD, 2016b). An improvement in science scores has also be recorded for 8th grade students between 2011 and 2015, according to the TIMSS measurement (IEA, 2015).

Scientific education plays a major role in higher education and research. In Sweden, around 30% of graduates obtained their master's degree in science or engineering, manufacturing and construction, and more than half of doctoral graduates acquired their degree in sciences and engineering (OECD, 2016a). Medicine, natural sciences and engineering are also the research areas that attract the more postgraduate students.

Environment

Sweden has a long-standing tradition of environmental education, which is considered a key element of progress towards sustainable development. Teaching of basic environmental issues begins at the pre-school level and expands in primary school. The secondary school curriculum, which was updated in 2011, covers sustainable development aspects in several subjects. The new guidance documents mark a shift from the concept of environmental education towards the concept of education for sustainable development, including ecological, social and economic sustainability (OECD, 2014b).

According to the OECD PISA survey, Swedish schools play a bigger role in teaching children about most environmental issues, on average, than schools in other OECD countries. For example, 65% of

children in Sweden learn about water shortages and 72% learn about nuclear waste issues at school, against fewer than 59% on both counts for OECD countries on average (OECD, 2014b).

The "School for Sustainable Development" project run by the National Agency of Education provides annual awards to schools with achievements in sustainable development; to date, 400 schools have received such an award. In addition, over 2 500 Swedish schools have been awarded a Green Flag – an international distinction under the Eco-Schools Programme that is co-ordinated nationally by the Keep Sweden Tidy Foundation.

According to the Swedish Higher Education Act (1992), higher education institutions should promote sustainable development. Since 2011, all public universities and colleges must report annually to the government on their environmental work. Several have been certified to the ISO 14001 EMS standard. In addition, the use of natural resources, environmental protection and climate-change related disciplines are taught at Bachelor, Master and Doctoral levels.

The Swedish Environmental Protection Agency and the Ministry of Environment and Energy are responsible for raising the population's environmental awareness and providing information about current challenges and the state of the environment. They are also setting environmental objectives and targets at the national level, with the overall objective of ensuring a good quality of life for future generations.

Notes

1. Electricity production sources (2014): hydro power (42%), nuclear power (41%), wind power (8%), solar power (0.06%), and other thermal energy (9%) (IVA, 2016). The production of electricity makes the second largest contribution to the share of renewable energy with hydroelectric power as the main source, followed by biomass-based electricity and wind power. Bioenergy is used primarily for process heat in industry and for residential heating.
2. In these places, one in four village shops disappeared during the period 2004-14 (SBA, 2016a).
3. Vocational introduction employment concerns people who lack relevant experience in the occupation, and are mentored or trained during part of their working hours.
4. The introduction programme is a two-year programme which provides language classes and a wide range of targeted activities aimed at preparing new humanitarian migrants and their families to enter the labour market.
5. In 2015, Swedish 15-year old students scored 493 in science, 494 in maths and 500 in reading, on average. Corresponding figures for OECD average are 493, 490 and 493.
6. In 2015, Swedish adults scored 279 in literacy, 279 in numeracy and 44 in problem solving in technology-rich environments. Corresponding figures for OECD average are 268, 263 and 31.
7. SLU is mainly located at Uppsala, Alnarp, Umea and Skara. Research activities and environmental monitoring and assessment are carried out throughout the country.
8. Number of newly registered students on programmes related to agriculture or food at SLU: 525 in 2013, 511 in 2014, 529 in 2015, and 422 in 2016.
9. For instance, the Swedish Food Federation estimated an annual labour need of 100 new food process operators while only 50 operators are trained each year at upper secondary school, and they will have to meet the needs of the food industry and all other processing industries (pharmaceuticals, chemistry, plastics, and paper).
10. Average monthly salary in SEK (2016): 32 800 across all occupations and 24 800 for food processors.

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