

THE FUTURE OF SKILLS

A case study of the agri-food sector in Morocco

Summary note

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The European Training Foundation (ETF) has initiated an international dialogue on the impact of digitalisation, globalisation, migration and climate change on employment and education in developing and transition economies. This note presents the main findings of an ETF study, one of a series, which focuses on the agri-food sector in Morocco, exploring drivers of change for skills and their impact on technologies and skills needs. The study combines traditional research methods with big data text-mining.

The study explores the relationships between technological change and skills demand. It covers farming products and food processing, small traditional farms, cooperatives and large highly mechanised farms but it does not include subsistence agriculture, which represents a substantial part of the Moroccan economy. The study provides a basis for reflection and action required to prepare workers for the jobs of the future.

BACKGROUND CONTEXT: THE AGRI-FOOD SECTOR IN MOROCCO

The Moroccan society and economy depend heavily on agriculture. The sector still employs around one third of the population (down from 45% in 2006) and accounted for some 12% of GDP over the past five years. Some 70% of farmers own less than five hectares. The food processing industry has a smaller but increasing workforce. Some 141 000 Moroccans work in this sector. The agri-food sector accounts for around 21% of total exports.

Agricultural production is vulnerable to water scarcity. In years of drought, GDP shrinks considerably. The Morocco Green Plan (2008–2020) improved water management through investment in more efficient irrigation, crop differentiation and greater self-sufficiency.

Government intervention fosters collaboration and cooperatives to improve productivity and to stimulate entrepreneurship and the introduction of new technologies in small farms. However, the severe shortage of managerial and financial capacity hampers their sustainability and development.

The government has supported the sector by creating ‘agropoles’. To date, two of the proposed six agropoles have been established.

CHALLENGES

The agri-food sector tends to rely on traditional technologies and skills but today global trade, competition, climate change, sustainable farming, changing consumer behaviour and new technologies are forcing radical change.

Successful, sustainable growth in agri-food requires the implementation of new technologies and the associated development of the education and skills of the workforce. Technological change is pervasive and can be disruptive. The pace of, and uncertainty about, technological change present challenges in identifying emerging skill needs. Although some forms of work will disappear, their demise will be offset by change and development of exciting work and new occupations.

Two categories of work will be affected most: technical occupations and their derivatives, and business and related services occupations. All work will experience change from digital processes, workers will require multidisciplinary skills accompanied by soft skills, particularly valued by employers in conjunction with technical competences.

The Moroccan government supports the agricultural and the agri-food sector through two main policy platforms:

- the Green Morocco Plan (Plan Maroc Vert) 2008-2020, which focused primarily on productivity;
- the Generation Green Plan 2020–2030, which shifts this focus towards human capital development and quality enhancement.

Both long-term strategic plans emphasise the need for environmental responsibility and sustainability. This will require innovative, responsive, targeted education and training at all levels and more pro-active cooperation between education and training providers and industry.

EMERGING TECHNOLOGIES

Moroccan patent data were studied as a way of predicting change. They reveal an emphasis on innovation in irrigation systems, biochemistry, pesticides and fertilisers. Such innovation is associated with responding to aridity, climate change and environmental sustainability. Other technologies and processes important to the sector include data acquisition and analysis, solar thermal devices (solar collector, heating devices, heat carrier medium), chemical separation techniques (flash and column chromatography), telemetry for reducing energy consumption and harvesting machines for precision farming.

DRIVERS OF CHANGE

Skills needs are driven by technological and non-technological factors. In seeking to understand these, the researchers used data mining tools to produce a clustered network. Correlations between the topics provide an insight into their relationships. For example, innovative solutions could lead to the reuse of agricultural waste to produce biomass energy, leading to a positive environmental impact and the reduction of deforestation. Examination of the clusters helps to identify potential drivers of change.

Globalisation

Globalisation emerges as a primary change driver. An open borders market, a concomitant of globalisation, may discourage small producers, but for others it stimulates international collaboration. International trade requires new infrastructures and technology in business services and related occupations. Managers and marketing and sales personnel need to be appropriately trained because companies need to increase their visibility to maximise the value of their products. International trade has shifted production towards, for example, olive oil and the development of niche markets, such as organic bio-agriculture and argan oil.

International trade stimulates a quality production culture with high standards and efficiency to improve competitiveness. Regulations and standards for international trade provide an impetus for quality processes and to satisfy environmental standards. In turn, these influence the home market. Medium-sized and larger companies generally embrace the change required by competitive, international markets and the rewards that they offer. Small farmers, on the other hand, generally have short-term goals and are less motivated by the potential of globalisation. They need more support.

Government and regulation

The government pushes for change through long-term strategies, the development of cooperatives, support for education and training, and initiatives such as the agropoles. It recognises the threat of severe droughts affecting crops with high water consumption, such as tomatoes. The development of new irrigation technologies, the construction of wells, the introduction of new plant varieties, are responses to that challenge.

Government policy is not always a stimulus. It may also have adverse effects when it comes in the form of high taxes, energy costs and product certification. These may disadvantage domestic companies in international competition.

Climate change

The impact of climate change calls for radical adaptation, especially in the supply and management of water. Such adaptation can stimulate growth in green industries and in environmental sustainability. The scale of the anticipated climate deterioration will necessitate extensive innovation in water storage and irrigation and new varieties of crops and plant protection techniques. Crop improvement and the development of new plant varieties that are resistant to disease and plant infestations is stimulating research, innovation and better use of water. All this requires the application of new technologies and a quantum increase in the personnel educated and trained with specific skills to implement and sustain them.

Energy

Morocco has limited domestic energy resources. It depends almost totally on external sources. Consequently, the cost of energy is high, which provides a strong incentive for companies to become energy efficient and develop alternative sustainable and environmentally friendly energy sources. Solar and biomass obtained from olive waste are good examples that require new skills to implement, maintain and augment innovation processes.

Organic farming

Organic farming, an aspect of the 'greening' policy, is reducing environmental impact by not using fertilisers and chemicals. It is a driver of technological change requiring new skills and training. Biological agriculture and agroecology agriculture contribute to the reduction of emissions, better soil and water quality, better energy efficiency, and higher quality and healthier food.

Quality

Quality standards provide a major stimulus for change and the use of relevant technology but only if standards are respected and enforceable. Publicising and enforcing legislation on quality standards and controls encourages consumers to move from the informal market to certified, healthier products.

However, among the general Moroccan population there is limited engagement with quality, possibly arising from natural conservatism but more probably for the pragmatic reason that quality produced goods sell at higher prices.

To improve and assure quality requires quality control in production and processing and is dependent on effective, functional technology, involving, for example, precision agriculture and minimising the use of pesticides. Accurate tests for traceability, storage and conservation are aspects of the quality standards process. All demand the application of technology by workers with new skills and adaptability to the regular updating and enhancement of technology.

Technology

While the potential of functional technology to improve agriculture is recognised, there has not been a full technological breakthrough in the Moroccan agri-food sector yet. Most innovation is related to effective irrigation and new plant varieties. Technologies that help to improve production efficiency are confined mainly to large farms. Most other farms continue with traditional methods and are reluctant to implement new technologies.

Typically, they are deterred by the high cost. However, perhaps the key impediment is a disposition among small farmers which is wedded to traditional methods. Both of these challenges can be addressed by a more integrated strategy of guidance, education, training and incentive.

Emerging technologies

The various drivers of change have implications for the types of technologies used in the agri-food sector. The analysis of patent data suggests that innovations in irrigation systems, biochemistry, and pesticides and fertilisers have been relatively commonplace (as indicated by the relatively large number of patents filed) and are likely to bring about future change in the agri-food sector. There are also a range of other technologies/technological processes which the text mining analysis indicates as being important to the sector in Morocco. These include, among others, data acquisition and analysis, solar thermal devices, chemical separation techniques, harvesting machines for precision farming, and image acquisition.

These technologies will become more commonplace in agri-food in the short to medium term. If these technologies are to be adopted the workforce will need to acquire the skills to operate them.

CHANGES IN JOBS AND SKILLS DEMAND

The application of a technology is associated with and depends on the skills to implement it. However, it is not sufficient to identify occupations associated with change. It is necessary to drill down to the skills within these occupations and identify which skills need updating.

A fear is that the introduction of new technology may make some jobs obsolete and thus cause unemployment but there is ample evidence that it also creates new jobs and opportunities. It will also transform jobs, by transforming job tasks and the way in which they are performed. Both technology and business services-related occupations will be affected by technological change.

Agronomists, for example, will need a wider range of knowledge and skills. Farmers must learn how to grow and test their products to meet quality and health standards in particular environmental and sustainability imperatives. All work will be accompanied by increased digitisation, mechanisation and automation. This will generate an expectation for more relevant vocational education and training.

Increased consumption of processed foods in Morocco has created a growing market for new skills in pastry, gastronomy, cheese, etc. The enhancement of local products and 'identity' recognition are further new fields. Such development of higher added value stimulates demand for new professions that require multi-disciplinary scientific and technical knowledge, including new fields such as consumer psychology and behaviour. Another arising need will be for niche markets such as the use of olive oil in cosmetics or pharmaceuticals or the combustion of waste products for energy production.

The digital permeation of work means that computing skills and data analysis dominate the skills landscape. Technological change has an impact on all levels of work. Occupations most likely to be affected include water plant technicians, biochemical engineers, sensor engineering technicians, bioengineers, water engineers, fluid power engineers and wastewater engineers and technicians, soil and plant scientists. Medium-skilled farming occupations will also need to adapt to technological change. Professions such as environmental economist, solar energy system engineer, geospatial information scientist and technologist and geographic information system technician will assume increasing relevance in the labour market.

Business services and related occupations will also be impacted from the introduction of new technology. The demands of international trade, quality assurance and product identity will stimulate demand for food scientists, supply chain managers, manufacturing and packaging managers, storage and distribution managers and logistics related profiles, all with wider skill sets.

MEETING THE CHALLENGES IN SKILLS DEMAND

Many factors influence the recruitment and retention of qualified personnel in agriculture: low attractiveness of the sector, emigration of high-skilled workers, the rural location of enterprises that clash with a preference for urban living, the differential quality and supply of trained personnel from the education and training system, etc.

The development of the agri-food industry depends on the implementation of new technologies. This can only be achieved and sustained with trained personnel at all levels. The need for improved, more accessible, flexible and responsive education and training is widely recognised.

There are high-level degrees in agro-industry engineering and technology but employers suggest that their curricula are often too theoretical. A key problem is the deficit in the education and training of technicians. For example, there is only one training centre in the whole country for agri-food technicians, which is based in Casablanca. Although there are many business and management schools, there is a dearth of focus on the specific business and management needs of the agri-food industry.

Large companies have responded to the skills gaps in a variety of ways. Internships, organised with universities in Morocco (and with other countries for international experience), provide work experience for students and an opportunity for enterprises to evaluate employment potential.

In the last three years, offers to new engineering graduates have quadrupled. Companies increasingly offer in-house training with government support. The demand from companies for continuing training has doubled in the last five years. On the other hand, work-based learning (as distinct from work placements and internships) seems to be less appreciated. Yet, this can potentially address the need for education institutions and enterprises to cooperate more closely to ensure relevant curricula and training.

POLICY REFLECTIONS

Exploiting innovation as an opportunity for all workers in the sector

In spite of imaginative, well supported, national planning initiatives and multidisciplinary centres (agropoles), the agri-food industry in Morocco continues to operate in two widely divergent divisions. On the one hand, there is a small number of highly modernised, innovative, large companies. On the other hand, is the large traditional farming community that employs the majority of people and seems reluctant to embrace innovation. This community needs the most help to adopt new practices, raise skills levels, introduce new technology, develop a quality culture and diversify their products for new national and international markets.

Boosting cooperation among small farmers

Increased cooperation among small farmers coupled with a step change in the quality and content of guidance, vocational training and appropriate incentives offers routes for change. The rewards for the individuals, Moroccan industry and the country as a whole would be transformative. It would support the adoption of the green sustainability agenda and in so doing foster innovation, new types of employment and social and economic development. This may in turn reduce the informal market which at present impedes structural innovation.

The promotion of collaboration among small farmers and the establishment of cooperatives is a key element in government strategy. It provides a route for raising standards and productivity through the introduction of new, innovative methods and technology. However, to convert the cooperatives into successful entities requires dedicated work to engage with traditional attitudes and provide incentives to offset the higher costs compared with the informal market.

Equally important, the skills deficit must be tackled. The scarcity of managerial and financial capacity in the cooperatives undermines their sustainability, growth, adoption of competitive processes and quality control. The competence gap means that farmers are unable to take advantage of the available incentives. The national agri-food federation Fenagri developed a free digital platform for e-commerce, but some cooperatives were not able to access it because of the low level of digital skills in their workforce.

The cooperative system has considerable potential but it is unlikely to succeed without an agile education and vocational training system which offers cooperatives relevant skills guidance and training. Farmers of the future will need multiple skills as processes rely increasingly on technology and digitalisation to achieve environmental and sustainability goals.

Improving relevance and quality of education and training in the sector

Education and training are fundamental to the success of all policy initiatives and technology implementation. To meet the needs of the industry, a general review (and upgrade) of the education and training curriculum and facilities is essential to adapt to a green, sustainable agricultural model. Instilling basic and enhanced digital skills throughout education and training is essential for national and international competitiveness.

Particular attention must be paid to the deficits in vocational education and training. In addition to an overhaul of curricula, radical improvement of vocational education and training to become more flexible and adaptable to meet current and future skills needs is a priority. This means the establishment of new vocational schools dedicated to specific fields and the provision of more laboratories for practical work and the use of digital tools for delivery.

To meet the growing emphasis on export, vocational education and training should include competences for internationalisation such as an understanding of compliance laws and regulations, trade agreements, intellectual property, quality requirements, digital marketing. These changes will contribute to the enhancement of the attractiveness of the sector for young people.

More students should be given the opportunity for internships or work placements as part of their studies. Development of work-based learning qualifications would foster relations between education and training providers and enterprises and contribute to curricula that are fit for purpose.

These measures must be accompanied by a more pervasive provision of timely, detailed, shared information on emerging skill and training needs. Without this, education and training curricula will fail to reflect and support innovative development and change. As with other initiatives, this too will demand a more integrated environment linking research, government, employers and education and training providers in ongoing dialogue, precisely because this is a constantly evolving scene.

Adaptation of industry and workers to the pace of change in technology and skills make it essential that continuing professional and vocational education and training, reskilling and upskilling, with industry, government and education institutions working together, should become the norm. In this context education providers should be encouraged to be nimbler and introduce collaborative micro-credentials, where possible using blended learning, which would provide learner incentives and reinforce links with industry.

Encouraging integrated thinking

Greater integration and cooperation between agriculture production and food processing, between the two relevant ministries (agriculture and industry) and between small farmers, cooperatives and the large successful industries should be encouraged to facilitate policy implementation, industry development, technology transfer and more generally: quality, sustainability and productivity. This will require a structural change in cooperation mechanisms.

Increased investment in research and development is essential to stimulate and underpin technological innovation and the consequent upskilling and reskilling of employees at all levels.

The promotion of green technologies as profitable niches for Morocco needs to be integrated with other sectoral policies and refocused education and training for sustainability and diversification.

The Impact of Covid-19

Covid-19 has had a severe impact on the Moroccan economy. Some companies have responded positively, introduced new business models and shifted towards production and marketing of longer-life products.

The pandemic has demonstrated the importance of digitalisation to upgrade and enter high-value markets, increase productivity and align output with customer requirements. Farmers selling products online reach new customers. However, these benefits are less apparent in traditional agriculture, reinforcing the case for working more intensively with this sector.

Although the crisis has created uncertainty about future employment and skills demand in the sector, the nature of change is unlikely to be affected. Indeed, the introduction of technologies such as robots, drones and sensors for precision agriculture may be accelerated with a greater focus on self-sustainability in food production.

Covid-19 has also provided a considerable boost to distance learning and training.

Where to find out more

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