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## Transforming industries: Perspectives from agro-food and electronics and electrical in Egypt

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Egypt places high priority on the development of agro-food and electronics and electrical equipment (E&E). The COVID-19 pandemic, changing technologies and consumer preferences, and the potential of the African market are creating new challenges while at the same time opening up a new range of possibilities for Egyptian firms and entrepreneurs. This chapter of the PTPR of Egypt examines the opportunities and challenges for agro-food and E&E in Egypt in light of global trends. Based on peer review from Italy and Malaysia respectively, it provides a snapshot of each industry's structural features, reviews key elements of Egypt's current policy approach and identifies key elements for policy reforms.

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## Introduction

The Production Transformation Policy Review (PTPR) process for Egypt involved an in-depth look into two industries whose development is a priority for Egypt: agro-food and electronics and electrical equipment (E&E). These two industries offer complementary perspectives. Agro-food, with its large size in terms of both GDP and employment, is a pillar of Egypt's economy and intimately linked to the country's food security and natural resource base. E&E, even though Egypt has built some local capabilities, is a smaller sector that nonetheless has substantial room to grow and is expected to develop rapidly in the future. The COVID-19 pandemic, changing technologies and consumer preferences, and the potential of the African market are creating a new matrix of possibilities for Egypt to unleash the potential of these two industries.

This third chapter of the PTPR of Egypt draws on peer learning, from Italy on agro-food and Malaysia on E&E, to identify emerging opportunities and key challenges for these two industries. It is divided into two sections, one focused on agro-food and the other on E&E. The agro-food section presents a snapshot of the industry's recent export and foreign direct investment (FDI) performance and identifies key structural challenges the industry is facing; it then reviews the main elements of Egypt's policy approach in agro-food and identifies a roadmap for future reforms based on peer learning from Italy. The E&E section examines the sector's structure, reviews the main elements that have fostered the emergence of E&E in Egypt, and concludes by identifying key policy reforms, based on peer learning from Malaysia, for enabling E&E to continue growing.

Chapter 1 of the PTPR of Egypt provided an overview of the country's economic development, focusing on production, trade, investment and innovation. Chapter 2 discussed effective strategies, policies and tools to foster ongoing economic transformation in Egypt. Chapter 4 focuses on the AfCFTA as an accelerator of industrial upgrading in Egypt and its partner countries.

## Focus on agro-food in Egypt

### ***Agro-food exports and FDI to Egypt have been on the rise***

Agro-food in Egypt is under the spotlight for several reasons. It is among the priorities for upgrading and growing the country's export capabilities in Egypt's Vision 2030 and the National Structural Reforms Program (2021-24), while globally the industry is undergoing major changes marked by a growing attention to quality and sustainability of production chains. The unfolding of the COVID-19 pandemic has increased the need for self-sufficiency to prevent the negative impacts of supply chains disruptions and dependency on foreign markets. Food manufacturers' production capacity reportedly dropped by 30-40% during the first month of the pandemic, together with contractions in sales and revenues (UNIDO, 2020<sup>[1]</sup>). The loss of markets from tourism, restaurants and hotels also negatively affected the sector, while the export market experienced a contraction, although to a lesser extent than overall exports. The average monthly decline for agro-food exports during February-August 2020 compared to 2019 was -7%, 2.5 times less than the total average (-18.7%) [authors' elaboration based on UN Comtrade (2021<sup>[2]</sup>)]. The need for shifting up a gear in the agro-food sector – by updating it to make it more efficient and competitive in the future – is more pressing than ever.

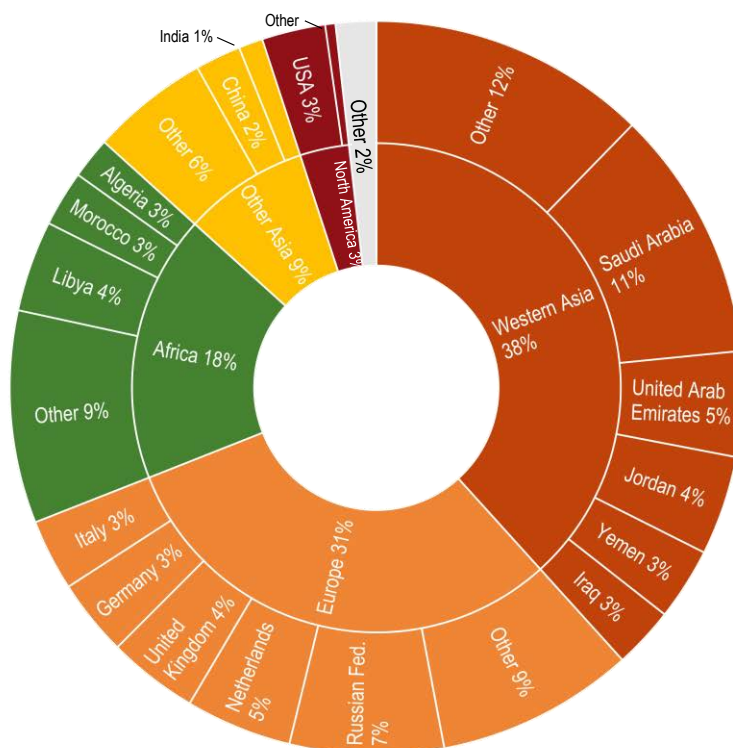
Supported by rich natural conditions along the river and its delta with two crops per year, agriculture has long been a critical sector for Egypt's economy. The Nile provides 96% of Egypt's water and three-quarters of this water is used for agriculture. Over 90% of the country's nearly 100 million people inhabit lands directly adjacent to the Nile Valley and the delta, an area comprising less than 5% of the total land area of Egypt, while the rest of the country is marked by desert land with no forest or permanent vegetation. Agro-food employs 24% of the total labour force and 80% of employment in rural areas (data refer to 2018). Of the 6.3 million employees in the sector, 90% are in agriculture and the remaining 10% in food processing

(ILO, 2020<sup>[3]</sup>). Egypt has the second-largest agro-food industry (by total value added) in Africa, behind Nigeria. Agro-food accounts for 14% of GDP, similar with other neighbouring countries such as Morocco (16%) and Tunisia (13%) [authors' elaboration based on United Nations (2021<sup>[4]</sup>) and UNIDO (2021<sup>[5]</sup>)].

Egypt specialises in the production of primary agro-food commodities. About 90% of total value added in agro-food for Egypt comes from field crops – mainly cereals, vegetables and fruits; the remaining 10% is ascribable to food and beverage industries. Agro-food in Egypt has increased its export orientation. Agro-food accounted for 17% of total exports during 2018-20, double the 8% during 2005-07 [authors' elaboration based on UN Comtrade (2021<sup>[2]</sup>)]. This increase stems mainly from the increase in production of fresh products and processed fruits and vegetables, due to modernisation of existing farms and processing/production facilities. Oranges are the main export, accounting for 13.3% of total agro-food exports. In 2019, Egypt became the largest world exporter of oranges in term of quantity, and the third in terms of value behind Spain and South Africa (ITC, 2020<sup>[6]</sup>). Other relevant exports include other fresh fruits, such as grapes and strawberries (which account for approximately 10% of total agro-food exports), dairy products (6%), potatoes and frozen vegetables (5% each) [authors' elaboration based on UN Comtrade (2021<sup>[2]</sup>)]. Primary agricultural products account for 56.3% of Egypt's agro-food exports – similar to Morocco (48%), but over three times the share in Italy (16%). However, when it comes to Egyptian exports to Africa, the share of primary products decreases to 25% and that of processed products reaches 75%. Egypt remains a net importer of agro-food products because local production has been unable to keep up with rapid population growth, with the value of exports equal to between 30% and 40% of imports in recent decades. Wheat accounted for 21.6% of total agro-food imports during 2018-20, followed by maize (14.4%) [authors' elaboration based on UN Comtrade (2021<sup>[2]</sup>)]. The country's top agro-food import sources during 2018-20 were grain producers, such as Russia (14.4% of total imports), Brazil (14%) and Ukraine (10%) (Figure 3.1).

Africa is an important market for Egypt's agro-food industries. The continent accounts for 18% of Egyptian exports, higher than the merchandise average of 15.4% (Figure 3.1). Within Africa, Egypt's main export destinations are located in the nearby Northern African market – namely, Libya, Morocco and Algeria, which together account for 8.3% of total agro-food exports; and East Africa, such as Eritrea (2%) and Kenya (1%). Africa is the third largest market for Egyptian agro-food products after Western Asia, with countries such as Saudi Arabia (11% of total agro-food exports), United Arab Emirates and Jordan the main destinations. Europe has also been a traditionally large market for quality Egyptian products and, together with Asia, offers opportunities to market higher-value products. Consumers in Europe and other advanced markets value freshness, which nearby Egypt can provide, while African consumers are looking to Egypt to supply them with processed foods for their industry and final consumption (Figure 3.2).

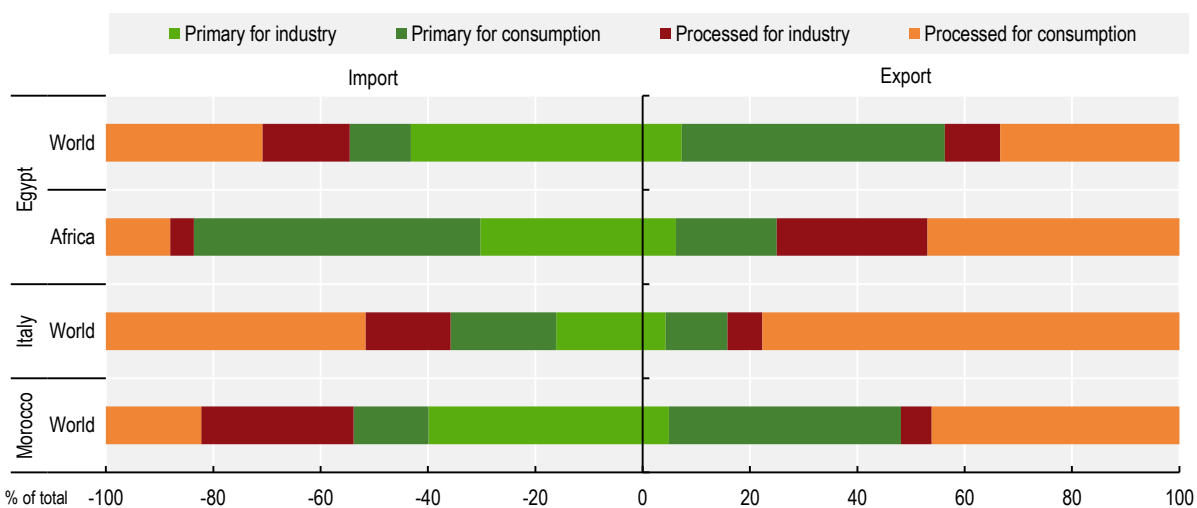
**Figure 3.1. Agrofood exports, by region and country, 2018-20**



Note: Percentages may not amount to 100% due to rounding.

Source: Authors' elaboration based on UN Comtrade (2021<sub>[2]</sub>), database, <https://comtrade.un.org/>.

**Figure 3.2. Composition of agro-food trade, Egypt and selected countries, 2018-20**



Note: Agro-food definition in HS classification combined with the classification by Broad Economic Categories (BEC) to generate breakdowns by type of commodity (primary or industrial) and destination (consumption or industry). Data for Morocco are for 2017-19.

Source: Authors' elaboration based on UN Comtrade (2021<sub>[2]</sub>), database, <https://comtrade.un.org/>.

Subsistence and small scale agriculture continues to be prevalent. Egypt's agro-food is marked by dualism, where large swathes of subsistence agriculture, particularly in the Delta, co-exist with large modern, capital-intensive farms, often located in reclaimed desert lands. Over 87% of agricultural farms occupy less than 1 hectare in Egypt (according to the last census carried out in 1999/2000), and these cover 47% of the agricultural area. By contrast, medium and large farms with over 20 hectares account for 0.1% of farms, but 11% of total area. In fact the average land holding size in Egypt is small and decreased from 1.6 hectares in the 1960s to 0.8 hectares in the 2000s, much lower than Tunisia (10.5) and Morocco (5.8) (FAO, 2013<sup>[7]</sup>; Lowder, Skoet and Raney, 2016<sup>[8]</sup>). Employment statistics yield similar results, with 86% of agricultural establishments in Egypt having between 1 and 4 employees, compared to 77.6% in manufacturing (CAPMAS, 2018<sup>[9]</sup>)

While modern commercial firms, predominately of larger size, are reaping the benefits of agro-food exports and local markets (Box 3.1), smaller farmers are facing a wide range of issues. One is high business informality: around 63% of agriculture smallholders are in the informal sector, with difficulties in accessing finance, labour shortages due to increasing urbanisation, low levels of technological adoption, and lack of knowledge of agricultural practices (CAPMAS, 2018<sup>[9]</sup>; Oxford Business Group, 2019<sup>[10]</sup>; Ministry of Trade and Industry, 2018<sup>[11]</sup>). In addition, several firms lack certification and awareness of the importance of quality and standards that make it difficult to maintain food safety, avoid contamination and use resources efficiently.

### **Box 3.1. Egyptian agro-food businesses are capturing the benefits of growing markets and new technologies**

Egypt has several large agro-food businesses. Whereas some have had an international perspective from the beginning, others have more recently built on their success in the domestic market to move into new products and capture export markets. Among these, Edita Food Industries and Juhayna stand out as two of the largest food companies (and the most recognisable brands) in Egypt. They were the 19<sup>th</sup> and 22<sup>nd</sup> largest firms by market capitalisation in Egypt in 2020, and the 9<sup>th</sup> and 11<sup>th</sup> largest in Africa in the food sector.

Juhayna is a dairy company founded in 1983 and headquartered in Giza, Egypt. Since the late 2000s, Juhayna has diversified its business from dairy to also include juice and has moved upstream to create an integrated production model that goes from farming to distributing. The firm now owns approximately 1 000 hectares of cultivated land in the New Valley Governorate and more than 1 500 hectares in Bahareya Oasis (Al-Aseela), as well as 4 production facilities and 28 distributions centres across the country. Products under the company's 10 brands are exported to over 30 countries, mainly in the Middle East.

Edita Food Industries is a snack food manufacturer founded in 1996 and headquartered in 6<sup>th</sup> of October. Chipita International is a major shareholder. After producing its first packaged croissants in 1997, over time Edita expanded its offerings, adding other baked snacks as well as cakes and wafers, and by 2019 had established five production facilities. During 2005-08 the firm upgraded its facilities and acquired quality certifications (e.g. ISO). The company now exports to 17 countries in the Middle East and North Africa, with exports comprising 8.5% of total revenue in 2019, up from 6.5% in 2015.

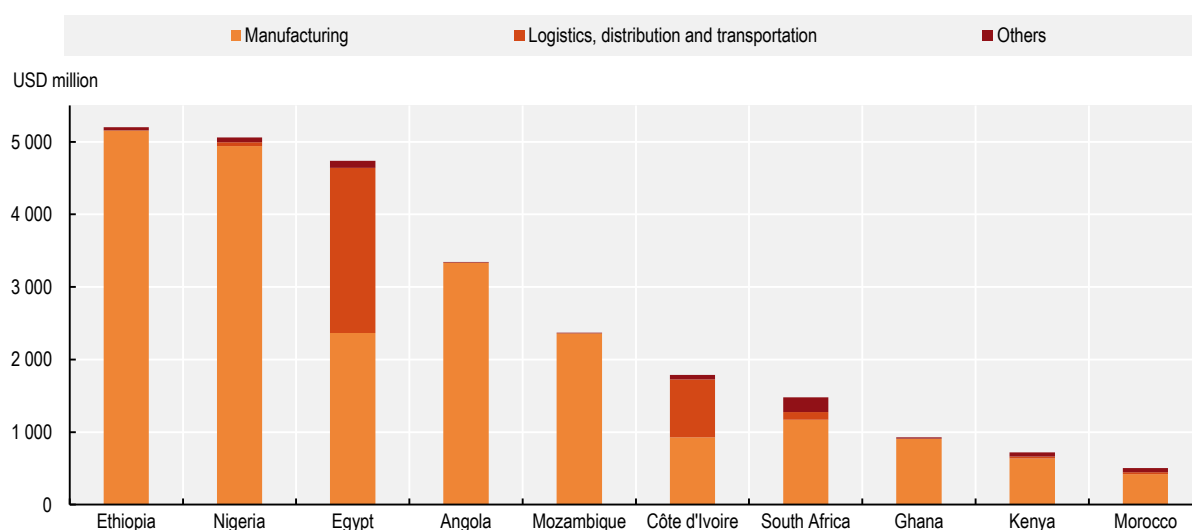
Start-ups are also emerging in Egypt to develop new technologies for the country's agro-food sector. Baramoda is a start-up founded in 2016 that seeks to reduce agricultural waste by converting it to organic fertilisers. According to the company's data, its processes can reduce water usage by 30%. The company has already built a factory in Qena. Baramoda has been growing rapidly, processing 2 000 tons of fertilisers in 2017, 9 000 in 2018 and 15 000 in 2019.

Source: Annual reports, African Business Magazine (2020<sup>[12]</sup>), AmCham Egypt (2020<sup>[13]</sup>).

Egypt's large market is attractive to foreign investors in agro-food. Since 2016, Egypt has been the third-largest recipient of agro-food greenfield foreign direct investment (FDI) in Africa, after Ethiopia and Nigeria. The rebound of the economy in 2016 attracted a number of new foreign investments in agro-food, totalling USD 4 billion. Whereas in most countries manufacturing projects make up the majority of investments, FDI in logistics and distribution plays an equally important role in Egypt. With an export mix concentrated on primary products, effective logistics platforms are crucial. Some of the largest FDI projects in agro-food in Egypt include the construction of grain silos and barges in Egyptian ports to facilitate imports (Figure 3.3).

**Figure 3.3. Since 2016, Egypt is the third-largest recipient of agro-food greenfield FDI in Africa**

Top 10 countries in agro-food greenfield FDI in Africa, USD millions, 2015-2020



Note: FDI investments are estimated figures. Agro-food sector defined based on the North American Industry Classification (NAIC) 2007 codes that relate to agriculture and food processing activities.

Source: Authors' elaboration based on Financial Times (2021<sup>[14]</sup>), *fDi Markets database*, <https://www.fdimarkets.com/>.

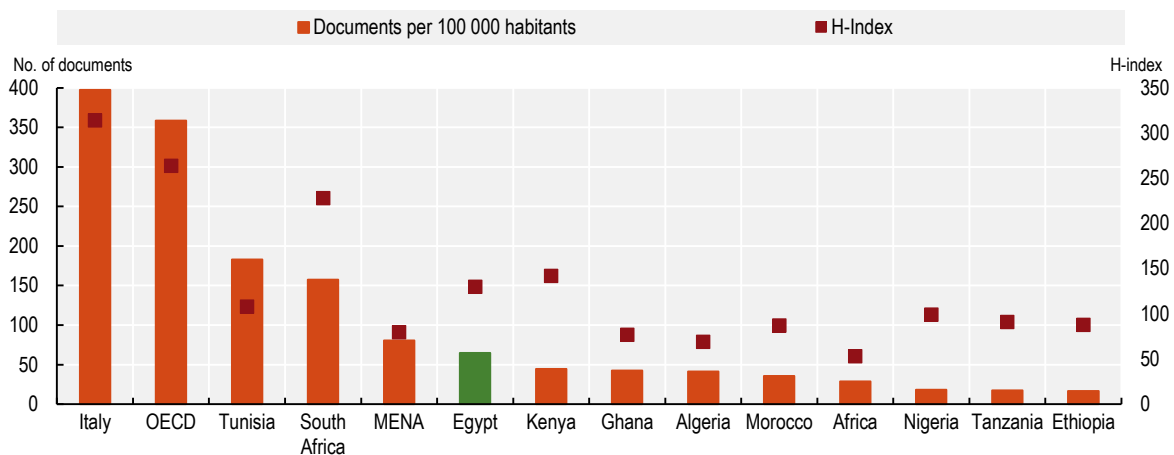
Investments in agricultural innovation could be higher. Egypt, in line with other developing countries, has focused its scientific and other innovative efforts on agriculture, in line with the sector's importance for food security and employment. About 22.7% of all full-time researchers in the country are employed in agricultural and veterinary sciences [authors' elaboration based on UNESCO (2021<sup>[15]</sup>)]. The Agriculture Research Center (ARC), the principal agency within the Ministry of Agriculture and Land Reclamation (MALR), alone accounts for 41% of the total number of researchers in the public sector (MHESR, 2019<sup>[16]</sup>). Other public institutions – such as the National Research Center, the National Water Research Center, the Desert Research Center, the Food and Agriculture Council, and universities – conduct relevant research and development (R&D) (Stads, Moussa and Badwan, 2015<sup>[17]</sup>). As a result, Egypt is the second-largest country in Africa in terms of scientific publications in agriculture after South Africa, and the third-highest in terms of papers per inhabitant. Egypt produced 64 publications per 100 000 inhabitants during 2017-19, more than two times higher than the African average (29) but lower than the MENA one (80). Nevertheless, the impact of scientific publications is lower than for some other regional peers (Figure 3.4).

Investments are also lagging behind. As data on business R&D in agriculture are lacking, government investments (which account for 95.4% of total R&D in Egypt) are used as proxy. According to FAO data, Egyptian investments in agricultural R&D stood at 0.62% of agricultural value added in 2016 – the same level as the government's overall R&D investments as a share of GDP (0.68%) that year, but 3.7 times

lower than South Africa (3.7%) and well below the 1% target recommended by the United Nations and the New Partnership for Africa's Development (NEPAD).

### Figure 3.4. Egypt has the third-highest number of scientific publications in agriculture per 100 000 inhabitants

Scientific publication per 100 000 inhabitants and H-Index in agricultural sciences, Egypt and selected economies 2017-2019



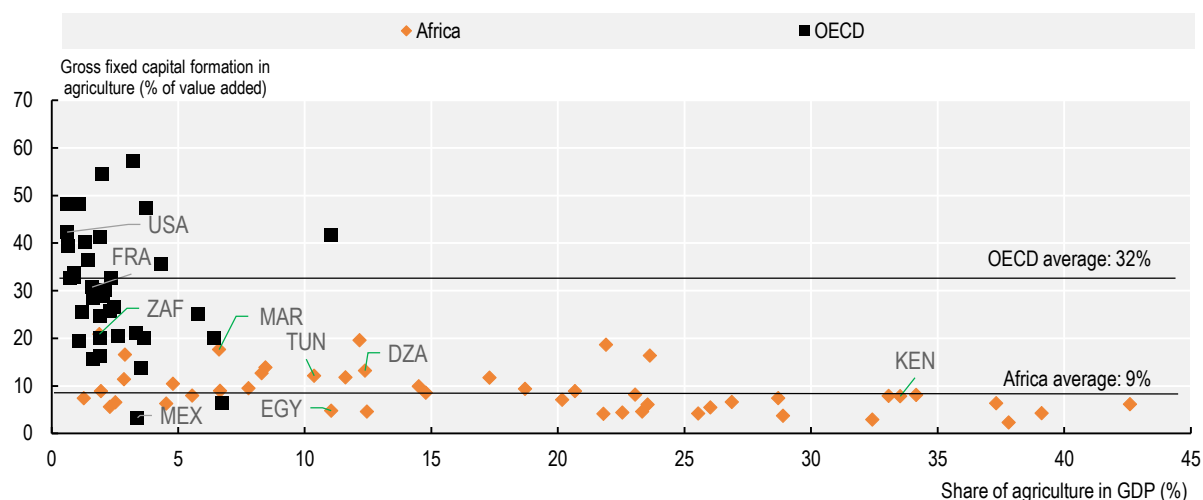
Note: H-index is an indicator that aims to quantify productivity and impact of scientific publication. It measures a country's number of articles (h) that have received at least h citations.

Source: Authors' elaboration based on Scimago Journal & Country Rank (2021<sup>[18]</sup>), *country rankings*, <https://www.scimagojr.com/>.

Investments in modern technologies are also low in Egypt. Raising investments in fixed assets (including, machinery, buildings and other infrastructure) will be crucial for raising productivity and enabling agro-food firms to compete on the global stage. However, in Egypt, businesses lag behind in investing in such relevant assets. The share of gross fixed-capital formation in agriculture stood at 5% of agricultural value added in Egypt, more than six times lower with respect to the OECD average (32%) and also lower than the African average (9%) (Figure 3.5).

**Figure 3.5. Gross fixed-capital investments in Egypt's agriculture are 5% of value added compared to 32% in the OECD, 2019**

Gross fixed capital formation, share of agricultural value added (%) and share of agriculture in GDP (%), OECD and African countries



Source: Authors' elaboration based on FAOSTAT (2021<sup>[19]</sup>), Database, <http://www.fao.org/faostat/en/#data>; and World Bank (2021<sup>[20]</sup>), *World Development Indicators*, [https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?name\\_desc=false](https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?name_desc=false).

## Policies for agro-food in Egypt focus on exports, infrastructure and land management

Several bodies in Egypt oversee the development of the agro-food sector in Egypt. These include the Ministry of Trade and Industry, which promotes trade and industrial development; the Ministry of Agriculture and Land Reclamation (MALR), which charts agricultural strategies and policies; the Ministry of Irrigation and Water Resources (MIWR), which (together with MALR) regulates the distribution of water; and the Ministry of Supply and Internal Trade (MSIT), which is involved with the internal market, price-setting for strategic commodities, distributing subsidies and managing state-owned food enterprises.

A recent achievement in Egypt includes the establishment of the National Food Safety Authority (NFSA) in 2017 under the Prime Minister's Office, which has reshaped the food standards compliance landscape. The NFSA is now the main regulator protecting consumer health, ensuring food producers and processors meet standards of food safety and hygiene. The agency consolidated food safety functions that were previously spread over various ministries, agencies, municipal authorities, and other institutions, and simplified the implementation of food safety laws. The establishment of the NFSA was accompanied by new norms and regulations and the refurbishment of laboratories, enabling parts of the agro-food sector to increase their levels of certification. According to the (NFSA, 2020<sup>[21]</sup>), 445 agro-food companies have registered with the agency, indicating that they are on the way to being certified or have been certified already. The establishment of clearer quality standards is already helping to drive exports to new markets.

Other important pillars of the quality infrastructure (QI) system in Egypt's agro-food include the Egyptian Accreditation Council (EGAC), the Egyptian Organisation for Standardisation and Quality (EOS) and the National Food Safety Authority (NFSA). In future, Egypt could look to strengthen QI along the value chain – particularly in the upstream segment of agriculture production, which is outside of the purview of the NFSA – and ensure that services are accessible and affordable, particularly for the country's MSMEs.



Finally, working with other African countries to harmonise standards in the continent will also be important in allowing Egypt to capture the benefits of the African Continental Free Trade Area (AfCFTA) (Box 3.2).

### Box 3.2. Prioritising agro-food products in the harmonisation of quality standards in Africa

The volume and complexity of technical regulations and the variation in certification, testing and inspection practices and standards used by different African countries continue to pose an impediment to intra-African trade. Some progress has been achieved at the level of the Regional Economic Communities (RECs) in harmonising quality standards, with a particular focus on agro-food products. In the Common Market for Eastern and Southern Africa (COMESA) region, all standards which have been harmonised relate to the agro-food sector, including standards for pulses, sugars, fish, vegetable oils, mangoes, processed meat and poultry and requirements for food hygiene, labelling of pre-packaged foods and pesticide residues. Significant gaps remain, however, and efforts by the RECs have not been sufficiently co-ordinated at the continental level.

The African Continental Free Trade Area (AfCFTA) offers a platform for African countries to co-operate more effectively on quality infrastructure systems in support of the continent's regional integration process. Annexes 6 and 7 of the Agreement include commitments of State parties to facilitate trade through co-operation in areas related to technical barriers to trade as well as sanitary and phytosanitary measures. African regional standards already exist, providing a basis for advancing standards harmonisation in the context of the AfCFTA. With the support of the African Organisation for Standardisation (ARSO), a total of 1 353 standards have been harmonised across Africa, of which 345 (25%) relate to agriculture and foods products.

A prioritisation strategy is required to improve Africa's standards harmonisation process. The harmonisation of standards is a complex task that requires extensive, costly and lengthy negotiations. As a result, it will not be possible to harmonise all standards at once, and a well-informed and appropriate prioritisation strategy will be needed to maximise the impact of standards harmonisation in the framework of the AfCFTA.

In 2020, the United Nations Economic Commission for Africa (ECA), African Union Commission (AUC) and ARSO published a report which identifies priority products and value chains for standards harmonisation in Africa, informed by an analysis of RECs' commonly traded goods, comparative advantage vis-à-vis Africa, and existing industrialisation priorities and harmonised standards catalogues. Agro-processing was identified as a value chain with comparative advantage across all Africa's RECs, offering significant potential for strong forward and backward linkages. Products were identified as priorities for standards harmonisation in Africa if they met two critical criteria: (a) the product has comparative advantage in at least two RECs, and (b) a harmonised standard for the product already exists in at least one REC. According to this methodology, agro-food products featured heavily in the recommended list of priority products for standards harmonisation, which included fish, milk products, fruits and fruit juices, edible oils and cereals such as rice, wheat, maize and sorghum.

Source: ECA, AUC and ARSO (2020<sup>[22]</sup>), Identifying priority products and value chains for standards harmonization in Africa.

Egypt's policy mix to support agro-food can be grouped under three different instruments:

- **Direct and indirect support for firms.** The Export Development Fund (EDF) supports exporters of agro-food products through a non-repayable financial contribution of up to 10% of the total value exported (see also Chapter 2). In addition, the Export Development Authority (EDA), the Egypt Expo and Convention Authority (EECA) and the Agriculture Export Councils each provide various

types of support, such as dissemination of market information, capacity building and organisation of missions to trade fairs. Egypt also has in place various consumption subsidies for basic food items that shape incentives for producers (Box 3.3).

- **Infrastructure provision in the form of industrial parks.** The government has promoted industrial parks and zones (see also Chapter 2). Hundreds of various types of parks and zones exist in Egypt, promoted by different agencies. Some parks or zones aim to attract foreign investments, while others emphasise value addition of local products or the integration of large factories with small suppliers. Some even include large settlement and housing facilities with much public service infrastructure, from shopping malls to schools and hospitals. At least 67 industrial zones specialise, at least partly, in agro-food industries. Some of these parks allocate land to industrial developers that create the infrastructure for agro-industrial projects, including the use of side-products and residues and the recycling of waste as well as other services. Such sites in zones near the Suez Canal, the Delta, main agricultural production sites along the Nile and the new desert cultivation projects have been populated by agro-industrial companies. Applying best practices in the development of agro-industrial parks can help such investments realise their potential (Box 3.4).
- **Land reclamation.** Reclaiming desert lands and redistributing them for agricultural purposes has been a central element of agricultural strategies in Egypt for many decades (Box 3.3). The aim is to expand the available agricultural land and boost food production.

### Box 3.3. A brief history of agricultural strategies in Egypt

In the 1970s, Egypt saw the emergence of food security support policies in reaction to the world food crisis prevailing in the beginning of that decade. Egypt adopted policies and programmes to increase production of the main food commodities. An intensive programme was put in place to subsidise several food commodities, under a central planning and management system covering the production and distribution of most of the agricultural products. The subsidisation of basic food items, such as bread, edible oils and some other food items continues to this day.

In the 1980s, Egypt began implementing three different strategies to foster the development of the agricultural sector, mirroring developments in the wider economy:

- The **1980s Agricultural Development Strategy**, which dealt mainly with the liberalisation of the agricultural sector and adjustment of pricing policies and mechanisms as a means to reallocate resources and provide incentives to farmers to increase agricultural productivity. Reclamation activities from desert land also intensified during this period, with the total estimated at 2.5 million feddans until 2007. Irrigation facilities in such reclaimed areas have made possible desert agriculture, such as in Nubaria, Bustan, Toshka and East Owainat.
- The **1990s Agricultural Development Strategy**, which concentrated on completing the economic reform programme in the agricultural sector – liberalising cotton production, marketing and export; promoting agricultural research; and reviewing the policies and standards used in selecting the beneficiaries for distributing newly reclaimed lands.
- The **Agricultural Development Strategy Towards 2017**, elaborated in 2003, concentrated on achieving self-sufficiency in cereals and continuing the land reclamation programme. It also focused on the decentralisation of water management.
- The **Sustainable Agricultural Development Strategy (SADS) Towards 2030**, elaborated in 2009, with the main objectives of improving sustainability and productivity, raising competitiveness and investments and improving rural living standards.

The SADS was updated in 2019, with the **Strategic Objectives of Sustainable Agricultural Development 2030: Sustainable and Inclusive Agricultural Growth**, with the aim of achieving economic development, reducing poverty, enhancing food security, creating job opportunities and fostering climate change adaptation and mitigation. Among the main targets set are to:

- Increase the contribution of agriculture to the Egyptian national income from 11.5% (rate of 2015-2018) to 14% by 2025, and 17% by 2030.
- Increase the percentage of agriculture employment from 25.3% (ratio of 2015-2018) to 27% by 2025 and to 30% by 2030.
- Increase the value of exports of fresh and processed agricultural commodities and products by 100% by 2030. Increasing the value of exports from USD 5 billion in 2019 to USD 7 billion by 2025 and to USD 10 billion by 2030.

The Sustainable Development Vision (SDS) 2030 places additional emphasis on agro-industrialisation and the use of modern technologies, such as biotechnology and nanotechnology, in agriculture. The SDS also points to establishing (a) logistics stations to reduce waste and (b) a Center for Modernization of Agriculture as a new entity to implement initiatives in the sector.

International co-operation has been important for the implementation of agro-food development policies and practices in Egypt, and has included multiple partners, such as FAO, IFAD and UNIDO. Egypt is currently implementing the Country Strategic Opportunities Programme 2019-24 in co-operation with IFAD which aims at contributing to the sustainable improvement of rural incomes and resilient livelihoods in Egypt. Egypt also works with FAO to fund projects to increase the resiliency of agro-food systems and improve rural incomes across the country.

Note: 1 feddan (fed) = 0.420 hectares, 1.037 acres.

Source: Ministry of Agriculture and Land Reclamation (2009<sup>[23]</sup>), *Sustainable Agricultural Development Strategy Towards 2030*, <https://far-malr.gov.eg/pdf/en/Full%20SADS2030.pdf> and Ministry of Planning and Economic Development (2016<sup>[24]</sup>), *Sustainable Development Strategy: Egypt Vision 2030*, <https://mped.gov.eg/EgyptVision?lang=en> and additional information provided by official sources.

### Box 3.4. Integrated Agro-industrial Park Development in Egypt

According to UNIDO (2019<sup>[25]</sup>), Integrated Agro-Industrial Parks (IAIPs) are a geographical cluster of independent firms grouped together to gain economies of scale and positive externalities by sharing infrastructure – roads, power, communication, storage, packaging, by-product utilisation, effluent treatment, logistics and transport, laboratory facilities, etc. They are designed to establish synergies between agricultural producers and processors, input providers, and the recycling and use of agro-industrial waste and residues.

In its support for agro-industrial park development, UNIDO draws from best practices for setting up and operating industrial zones in the wider sense and for designing the installations and services that agroindustry businesses require at such parks. Cropping exploitations, livestock production units and collection centres outside the park should be “integrated” into the park design. Processing at the park must be linked to the value chain through stable contractual relationships with suppliers and solid plans for the marketing of final products including side-products. Where sourcing of primary materials is unsecure (for example because small farmers may change their production and sales decisions), the establishment of satellite rural collection and transformation centres should become part of the park design.

In Egypt, UNIDO has supported the development of an integrated agro-park in Qalioubeya (GTI, 2016<sup>[26]</sup>). The park aims to set up vegetable fruit and dairy and poultry processing units on 21 hectares; create income opportunities for 1 000 vegetable producers, 200 dairy farmers and 200 poultry farmers; and create jobs for 200 skilled workers and an additional 200 positions in services, logistics and the upstream and downstream segments in the value chains. The design foresees a “single internal transportation ‘one way’ system”. There are three functional elements in the design of the park:

- Location of processing businesses from the region combining production, processing, collection, R&D, trade and social functions;
- Rural transformation centres outside the park combining collection and storage of farmers’ products with rural advisory services; and
- A consolidation centre that serves as a metropolitan market, putting end-product producers in direct contact with consumers.

Source: UNIDO (2019<sup>[25]</sup>), *International Guidelines for Industrial Parks*, [https://www.unido.org/sites/default/files/files/2019-11/International\\_Guidelines\\_for\\_Industrial\\_Parks.pdf](https://www.unido.org/sites/default/files/files/2019-11/International_Guidelines_for_Industrial_Parks.pdf) and GTI (2016<sup>[26]</sup>), *Integrated Agro-Industrial Parks in Egypt*, <https://www.unido.org/sites/default/files/files/2019-05/Agro-Industrail%20Parks%20-%20Qalyoubia%20case%201.pdf>.

## A roadmap for unleashing agro-food potential

To fully realise its agro-food potential, Egypt would benefit from prioritising the following three areas. Firstly, Egypt should actively seek to enhance partnerships that will enable it to transition towards Agro-food 4.0 (i.e. the use of Industry 4.0 technologies in agro-food) and use it to make agriculture and agro-food sustainable, inclusive and innovative. Secondly, the country would benefit from enhancing national branding and better signalling the quality and originality of its produce to increase market value and gain increased market access in Africa and globally. Thirdly, Egypt should continue to improve its policies regarding MSMEs to ensure that all firms, especially micro and small ones, can benefit from technological change and new markets, while also addressing environmental issues and land and water scarcity. The following paragraphs present specific details for each of these areas.

### ***Enhancing partnerships for Agro-food 4.0 to make it sustainable, inclusive and innovative***

Increasing the adoption of Industry 4.0 technologies in agro-food could be a game-changer for Egypt. Water scarcity is currently a major problem faced by the Egyptian agro-food sector. Agricultural lands have seen their access to water reduced. Egypt’s annual renewable water resources per capita stood at 596.2 m<sup>3</sup>/capita in 2017, below the threshold of water scarcity defined by the UN (700 m<sup>3</sup>/capita), while projections estimate that it will drop below the level of absolute scarcity (500 m<sup>3</sup>/capita) by 2030 (FAO, 2016<sup>[27]</sup>; 2021<sup>[28]</sup>). According to CAPMAS (2019), agriculture consumes three-quarters of all water available. Groundwater, which is increasingly rising in importance as a source of drinking water and irrigation for the country, is facing salinisation due to over extraction and lack of drainage systems (FAO, 2016<sup>[27]</sup>). Salinisation of intensely irrigated lands as well as sedimentation of dams, rivers and feeder canals contribute to the inefficiency of water use. Climate change could further exacerbate these challenges for agricultural production and the food industries it supports. The WFP estimates that by 2040 Upper Egypt could lose 30% of its food production (WFP, 2017<sup>[29]</sup>). Continuing and expanding existing investments in modernising irrigation schemes and improving the quality and efficiency of use of water resources will be crucial (FAO, COMESA, AgWA and the Government of Egypt, 2015<sup>[30]</sup>).

Technological and organisational solutions to improve the productivity of the agro-food system need to embrace more prominently the opportunities that digitalisation, the Internet of Things, big data, artificial intelligence, remote sensing and new IT technology provide. Such Agro-food 4.0 technologies, applied at the level of primary production as well as manufacturing, pave the way to a more resource-efficient intensification of agricultural production and value addition. This goes beyond precision-farm applications, and has an impact along the entire value chain, providing smart solutions to producers, suppliers, manufacturers and buyers for the optimisation of production processes, equipment performance, logistics and customer management. Finally, Agro-food 4.0 can also be important in saving water in production and processing, a key challenge for Egypt.

Public policies could do more to foster Industry 4.0 in the economy including in agro-food (see Chapter 2). Increasing support for innovation as a whole, and for Agro-food 4.0 in particular, both in the public research system and in businesses, is vital. Egypt should also consider fostering technology adoption and adaptation, an area which has been relatively neglected compared to upstream innovation efforts. To make this happen, Egypt needs to consider updating and modernising its policy mix, by diversifying policy instruments available for agro-food firms and linking direct and indirect support to the development and adoption of technologies. For example, integrating digitalisation with green-growth incentive schemes and regulations to reduce waste and improve natural resource use, such as through targeted loans and grants, could help reap the benefits of digital technologies for sustainability. Finally, increasing support for researchers to acquire skills in Agro-food 4.0 is essential.

Global partnerships can also contribute to foster innovation in agro-food, including in Agro-food 4.0. Innovation does not flourish in a vacuum; rather, it relies on multiple stakeholders interacting together over time, forming a dense and varied ecosystem. International linkages can be critical in this respect, fostering cross-border access to new technologies, facilitating knowledge sharing, and helping adapt innovations to local markets. In this respect, attracting foreign investment in high-value-added activities is an important component for learning and building capabilities. In 2015-20, Egypt was the third-largest African recipient of FDI related to R&D activities in agro-food. Although the entire continent is still playing a marginal role at the global level, with only 5% of the total, it represents a big leap with respect to 2005-10, when Africa absorbed only 1% of total global investment and Egypt recorded none (Financial Times, 2020<sup>[31]</sup>).

Other means of building international partnerships can involve multiple stakeholders and formats (e.g. co-operation between governments; between the public, research and private sectors; or even only among businesses). They can also have multiple objectives, from strengthening investments in basic agriculture research to joint applied and development activities that involve technology transfer and technical co-operation to increase competitiveness of both farmers and food producers. Egypt is also a member of the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), which has fostered innovation and start-expansion in agro-food in Italy and its member countries (Box 3.5).

### **Box 3.5. CIHEAM: Promoting agro-food innovation through partnerships**

The International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) is devoted to the development of agriculture and sustainable food systems and to the support of an inclusive growth in rural and coastal Mediterranean territories. Jointly founded in 1962 by the OECD, the European Council and the governments of southern European countries, CIHEAM has 13 member countries: Albania, Algeria, Egypt, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia and Turkey. The organisation operates as a training, research and co-operation platform with four agronomic institutes: Bari (Italy), Chania (Greece), Montpellier (France) and Zaragoza (Spain). The Italian Institute in Bari (CIHEAM Bari) is the largest one.



The current CIHEAM mission is organised under the Action Plan For the Mediterranean 2025 (CAPMED2025), which is aligned with the United-Nations Agenda 2030 for Sustainable Development. In the implementation of its plan, CIHEAM relies on three main complementary tools that cover food security, food safety and nutrition; innovative agricultural production systems; natural resource management; and entrepreneurship:

- **Education and capacity building.** CIHEAM offers both specialised courses and master programmes that target post-graduates, officials and professionals of agri-food sectors in the Euro-Mediterranean Region, with a focus on enhancing gender opportunities and equality. During 1998-2020 the share of female MSc students rose from 29% to 61%, and female PhD students from 8% to 25%.
- **Applied scientific research.** CIHEAM engages in in-house academic and scientific production, organises forums for PhD students and Young Researchers, and leads a platform of researchers that use CIHEAM Institutes research facilities as well as affiliated institutes.
- **Co-operation projects.** CIHEAM pursues a bottom-up problem-solving strategy which involves local stakeholders (farmers, producers and associations) as well as national regional authorities in the assessment of their specific needs through a collaborative approach in the areas of sustainable food systems, precision agriculture, organic production and adaption to climate change, among many others.

#### **CIHEAM Italy leverages on the excellence of Italian agri-food system**

In 2020, CIHEAM Bari hosted the Mediterranean Innovation Hub as a midpoint between public and private stakeholders aiming to foster innovation in agro-food. The project involves young start-ups that provide innovative solutions to private sector challenges. It brings together the competences of several stakeholders along the entire value chain – such as private companies, industrial associations (Confindustria), agri-food cooperatives (Confcooperative and Legacoop) and universities – that together create new opportunities for innovative start-ups and youth entrepreneurship within networking programmes at various territorial and international levels.

CIHEAM Bari's network of collaborations with the Italian public and private sector comprises 45 academic institutions and research bodies, 48 organisations and private companies, 68 administrations (including regions and municipalities), and 32 industrial associations and productive districts.

Source: Teodoro Miano, Italian Government Delegate to CIHEAM Governing Board and Vice President, International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), presentation during the public-private roundtable on "The future of agri-food in Egypt", Paris, 26th October 2020.

#### **Updating branding, signalling quality**

Leveraging Egypt's country image is also a promising option to increase value addition. In a highly competitive global landscape, branding and reputation can help set Egyptian products apart and become an asset for penetrating new markets. Egypt could leverage on the country's unique geography, history and culture to signal quality in high-value markets both abroad and domestically (Box 3.6). Within Egypt there is also scope to better familiarise local consumers with quality and culturally distinctive products from the country's different regions by supporting marketing campaigns, setting up specialised shops and retail outlets and ensuring public food procurement takes into account the different local foods that Egypt is producing.

### Box 3.6. Leveraging the potential for typical Egyptian terroir food products

The programme on market access for agro-food products (UNIDO-PAMPAT) seeks to improve market access for “terroir products” and supports efforts by local producers to commercialise such products – not along global value chains, but to local high-value markets. The purpose of the programme is to generate higher value and more income and jobs for producers in the context of local economic development, and to promote healthy and higher-quality food products with more nutritional value for consumer.

In Egypt, the focus of UNIDO-PAMPAT is on products that are typically Egyptian, come from certain regions, and require specific knowledge for production and preparation. For example, the programme has organised a national contest showcasing some 400 local products from 27 governorates.

Source: UNIDO (2020<sup>[32]</sup>), *Inventorying of Egyptian Typical/Terroir Products*, Final Report, [https://www.unido.org/sites/default/files/files/2020-08/Inventorying\\_of\\_Egyptian\\_Terroir\\_Food\\_Products.pdf](https://www.unido.org/sites/default/files/files/2020-08/Inventorying_of_Egyptian_Terroir_Food_Products.pdf).

### Don't leave MSMEs behind

Realising the full potential of agro-food in Egypt requires addressing and minimising the dualism in the sector and identifying ways to better connect small, traditional farming with lead firms, domestically and internationally. The optimisation of food production – capital-intensive as it already is – will be easier to achieve in the higher-value food segments, especially for exports. It is important that the productivity increase also unfolds in traditional (staple) food production and processing that mainly caters to the domestic market, and this will require targeted and effective support – not only through adequate financing schemes, but especially through technical assistance and modernised extension services. In particular:

- *Co-operatives and shared infrastructure and services could do more to foster collaboration along the value chains.* Co-operatives have a long history in Egypt, from the start of the 19<sup>th</sup> century, and now have a reach that includes almost all farmers in Egypt. However, they largely focus on carrying out administrative functions in relation to agricultural policies and strategies (Ghonem, 2019<sup>[33]</sup>; IFAD, 2018<sup>[34]</sup>). Going forward, initiatives such as jointly operated collection centres and packaging stations for primary and semi-processed food products (as well as joint arrangements for cultivation of land, use of technology and marketing of products) could be collective actions that can be fostered by co-operatives.
- *Increasing technical assistance is vital for raising productivity across the board.* The traditional extension system can provide only part of the technical assistance that the smaller farmers need because it is overwhelmed by outdated skills among its agents, outdated training techniques, lack of resources and transportation facilities, and loss of reputation, among other factors. While upgrading of extension services seems to be an important element to improve farm operations among smallholders, private advisory services provided by input providers, buyers and finance institutions will also need to complement the diffusion of knowledge and innovation among farmers in Egypt. Technical assistance, demonstration courses and vocational training for the development of better skills are also required in the processing sector. In the food processing sector, continued efforts are necessary by MSMEDA and IMC to support small enterprises in product development, quality improvement, business development, and training and capacity-building, as well as in lending.
- *Facilitating access to finance is needed, particularly for micro and small firms.* Public policies have been enhancing access to finance for micro, small and medium enterprises (MSMEs) in recent years. The Agricultural Bank of Egypt (ABE), the main source of agricultural finance, is undergoing reforms to improve its services and delivery to the agro-food sector and to also employ credit

officers with knowledge of farming and agro-food to better cater to the sector's needs. ABE has also entered into a twinning arrangement with Rabobank, an international corporate bank specialised in agricultural value chain finance, and has signed a contract with MSMEDA worth EGP 50 million (USD 2.791 million) to extend credits to agro-processing MSMEs. The National Bank of Egypt in 2019 also reported that 14% of its credit portfolio is going to primary agriculture and food processing, and the share of agriculture-related lending has risen at an increasing rate over the last few years. The COSOP, a programme with IFAD, is also aiming to improve access to finance firms to foster value chain development in agriculture (IFAD, 2018<sup>[34]</sup>).

However, more can be done to increase financing for smaller firms. Only 2.26% of small agro-food firms receive loans compared to 21% of medium ones, according to CAPMAS (2018<sup>[9]</sup>). Expanding such initiatives to alleviate financing constraints for small firms – particularly devising instruments and increasing outreach for informal firms and those that may not be able to easily meet the collateral, credit history and other stringent requirements needed to access credit – will help unlock the potential of MSMEs in agro-food. In turn, using extension services to improve financial literacy among smallholders and MSMEs could also improve their ability to reach out to credit institutions to finance their needs. In addition, current land-reclamation initiatives could accommodate more small producers with limited access to resources. This would require additional investments in technical assistance and advisory services as well as specific credit schemes for small producers.

- *Supporting businesses in complying with standards is needed to strengthen quality.* Incentivising small businesses to access the quality infrastructure system – for example, by attaching relevant conditions to loans and other forms of direct and indirect support and training – has the potential to increase compliance. Designing a pay-off for the informal sector to participate will also be important. A starting point would be developing a culture of quality among producers and consumers. This could be initiated, for example, through a campaign for food safety that can be also linked to current COVID-19 containment measures, including on-line and in-person demonstrations for consumers and producers, starting with washing hands and handling food products. Demonstrations of new equipment and technology designed to improve quality management in production and distribution would then become a second step, to be followed by investment schemes that truly improve the income situation of informal businesses.

## Focus on E&E in Egypt

### A growing industry

Globally, electronics and electrical equipment (E&E)<sup>1</sup> is the top industry by manufacturing value added (MVA), accounting for nearly 13% of total, equal to the GDP of Korea [authors' elaboration based on UNIDO (2021<sup>[5]</sup>)]. Production E&E employs around 29 million people (equal to the population of the Netherlands and Greece combined), making it the top world manufacturing employer, together with textiles (which also has a global workforce of around 29 million workers). The top world producer is the People's Republic of China (hereafter "China"), accounting for a third of the world's total (33.6%), followed by the United States (17%) and Japan (9.8%). E&E accounts for approximately 20% of global merchandise exports during 2017-19. China is the world's largest exporter (24%), followed by the United States (7%) and Germany (6%).

In Egypt, E&E generated around 3.8% of the country's MVA in 2018, or approximately 0.6% of the country's GDP. According to the latest establishment census, in 2017 the sector employed 55 000 people, or 2% of total manufacturing employment. Egypt is a small producer compared to global hubs, accounting for approximately 0.6% of E&E world value added and exports. However, it has potential within the African continent. UNIDO provides statistics on the value added generated by the industry for a group of eight countries in the continent. Out of these, Egypt was the third-largest hub, generating about 60% the value



added of South Africa, the top performer, and accounting for nearly 23% of the group's total. Similarly, Egypt is the fourth-largest exporter, after Morocco, Tunisia and South Africa – generating about 13% of the continental total and double the country's average share of continental exports [authors' elaboration based on UNIDO (2021<sup>[51]</sup>) and UN Comtrade (2021<sup>[21]</sup>)].

E&E emerged in Egypt via the domestic market, mostly through state-owned enterprises that licenced foreign technologies or set up joint ventures with global leaders (UNIDO, 1994<sup>[35]</sup>). Since the mid-1970s, liberalisation reforms have enabled the entry of foreign and local firms into the sector (UNIDO, 1994<sup>[35]</sup>; UNCTAD, 1999<sup>[36]</sup>; Refaat, 1999<sup>[37]</sup>). Since Egypt's entry into WTO and the development of bilateral and multilateral FTAs focused on neighbouring regions, the country has reduced tariffs for E&E overall. The average most favoured nation (MFN) tariff is 8.4%, while for many of Egypt's FTA partners the rate is 0%. Nevertheless, an escalating tariff remains, with final products charged on average 10.5% (going as high as 60% for some radio and television receivers), while electronic components (e.g. chips) have zero tariffs (Table 3.1). The combination of regional FTAs, together with the proliferation of various zones that allow for duty-free intermediate imports as long as final products are exported (see Chapter 2), has encouraged some foreign investments in Egypt targeting Middle Eastern markets.

**Table 3.1. Average tariff rates for Egypt's E&E industry, by trade agreement and value chain segment, 2017-19**

Value chain segment	MFN	EU/COMESA/Agadir/PAFTA	Turkey	EFTA	MERCOSUR
Electronic components	0.0	0.0	0.0	0.0	0.0
E&E sub-assemblies and parts	7.3	0.0	0.1	0.1	5.4
Other E&E components	7.0	0.0	0.1	0.0	4.6
Final E&E products	10.5	0.0	0.0	0.0	4.1
Total E&E	8.4	0.0	0.0	0.0	4.2

Source: Authors' elaboration based on WTO (2020<sup>[38]</sup>), *Tariff Download Facility* (database), <http://tariffdata.wto.org/default.aspx>.

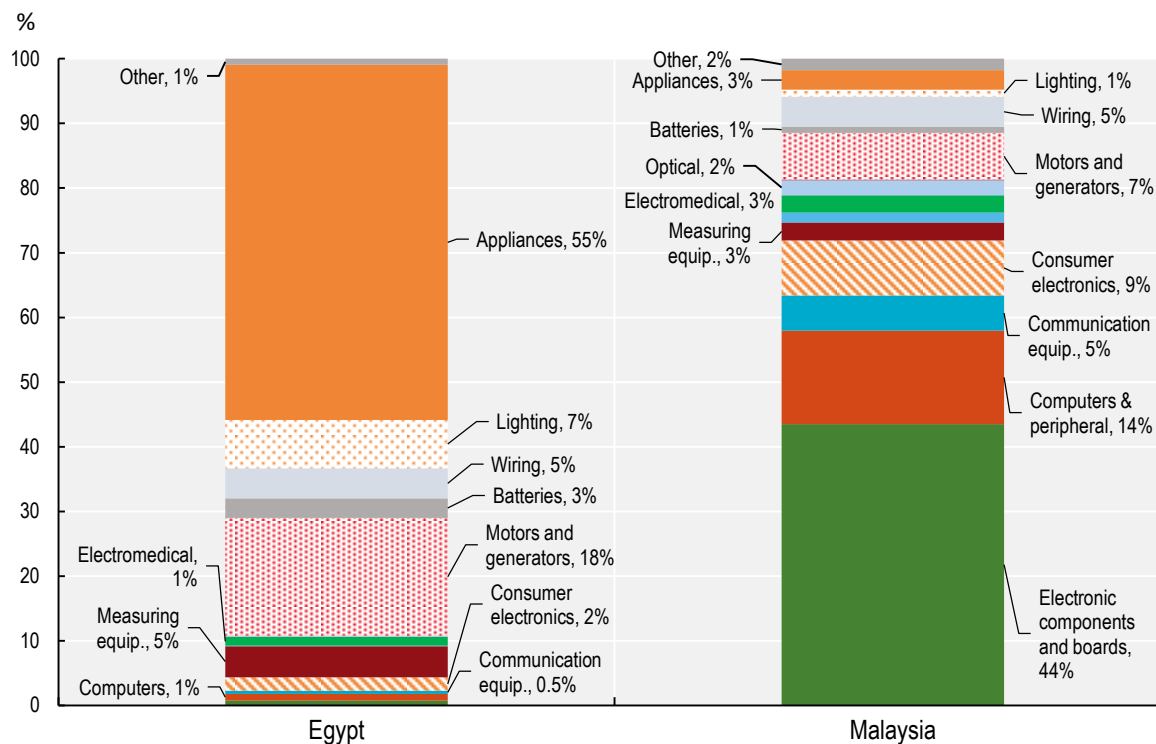
The lion's share of production in Egypt is generated by domestic electrical appliances, which absorb 55% of employment in E&E and are mostly directed to the domestic market, followed by electric motors and generators (18%) and lighting equipment (7.3%). Wiring and measuring and testing equipment account for 5% respectively. Egypt's pattern of specialisation in the production of final consumer appliances and some electrical components is markedly different to that of Malaysia, an export-oriented E&E hub in Southeast Asia that is among the world's top 15 global producers in the industry. Malaysia specialises in upstream electronic components and boards, which account for 44% of total E&E employment in the country. Malaysia also produces relatively more sophisticated final products, such as computers and peripherals (14%) and consumer electronics (9%) (Figure 3.6).

E&E firms concentrate in or near Greater Cairo. Greater Cairo, which includes the governorates of Cairo, Giza and Qalyubiya, accounts for 50% of all firms in the industry; within this, Giza accounts for the highest share, with 19% of total. An additional 15% of E&E firms are located in Sharqia governorate, and 9% in Alexandria (CAPMAS, 2017<sup>[39]</sup>). This review cross-checked lists of exporting manufacturing E&E firms provided by three different online sources, the International Trade Centre (ITC) through Kompass database, the Engineering Export Council (EEC) and the Information Technology Industry Development Agency (ITIDA). Additional research was conducted to locate the addresses of manufacturing facilities of these businesses through company websites and reports. The results were narrowed down to 104 Egyptian firms and foreign subsidiaries. In line with the census data, the majority of these firms were concentrated in Greater Cairo (57%). Most (17.3%) were in 6<sup>th</sup> of October, a city that was developed to house industries in Giza; the El Obour industrial zone (8%); and other Cairo and Giza locations. 10<sup>th</sup> of

Ramadan, one of Egypt's largest industrial areas located 60km away from Cairo at Sharqia, hosted 28% of these firms.

**Figure 3.6. Structure of E&E industry by employment, Egypt and Malaysia, 2014-16**

ISIC - 4 digits, share of total E&E employment, %

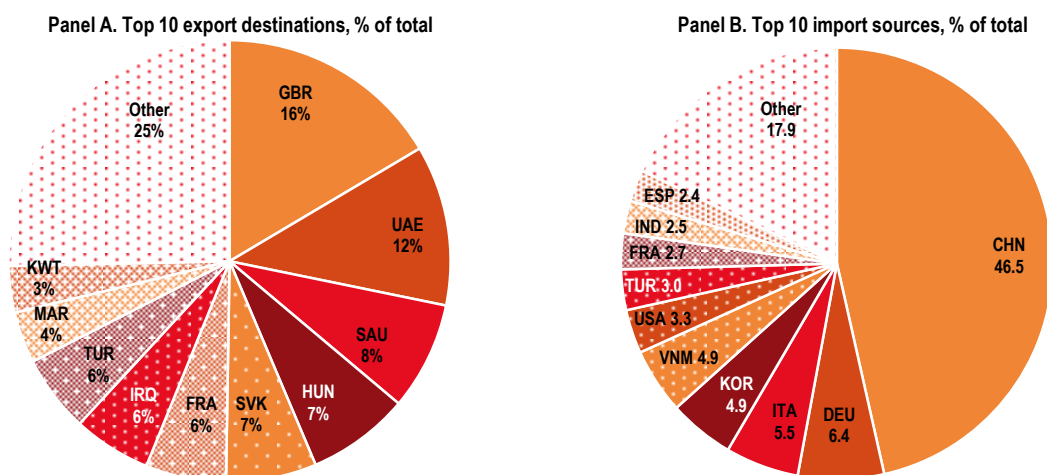


Note: ISIC descriptions have been shortened for visual purposes. Labels shown only for products that account for more than 0.5% of total.

Source: Authors' elaboration based on UNIDO (2021<sup>[5]</sup>), *INDSTAT* (database), <https://stat.unido.org/database/INDSTAT%202020,%20ISIC%20Revision%204>.

Even though the country is a net importer in E&E, both exports and imports have been rising rapidly, more than doubling since 2010. Egypt's E&E exports have been among the most dynamic in Egypt's export basket, increasing by 10.6% annually during 2010-19, 6.3 times the merchandise export average (1.68%) and higher than E&E imports (8.4%) [authors' elaboration based on UN Comtrade (2021<sup>[2]</sup>)]. During 2020, E&E exports fell by 8.7%, less than the overall contraction of 12.5% experienced overall (*ibid.*). Exports of E&E now account for approximately 6% of Egypt's total merchandise exports (2018-20), higher than at the beginning of the decade (4% during 2010-12). Egypt imports E&E mostly from China (which accounts for 46.5% of total imports), followed by Germany (6.4%), Italy, and Korea (approximately 5% each) (Figure 3.7). East Asia as a whole accounts for 53% of imports and Europe for 24%, while Africa accounts for less than 1%. In terms of exports, the top three export destinations in 2018-20 were the United Kingdom (17%), the United Arab Emirates (12%), and Saudi Arabia (8%). Africa accounted for 15.8% of Egyptian E&E exports, in line with the continent's overall share in Egyptian merchandise exports, and MENA for 43.2%, higher than the region's overall share at 31%.

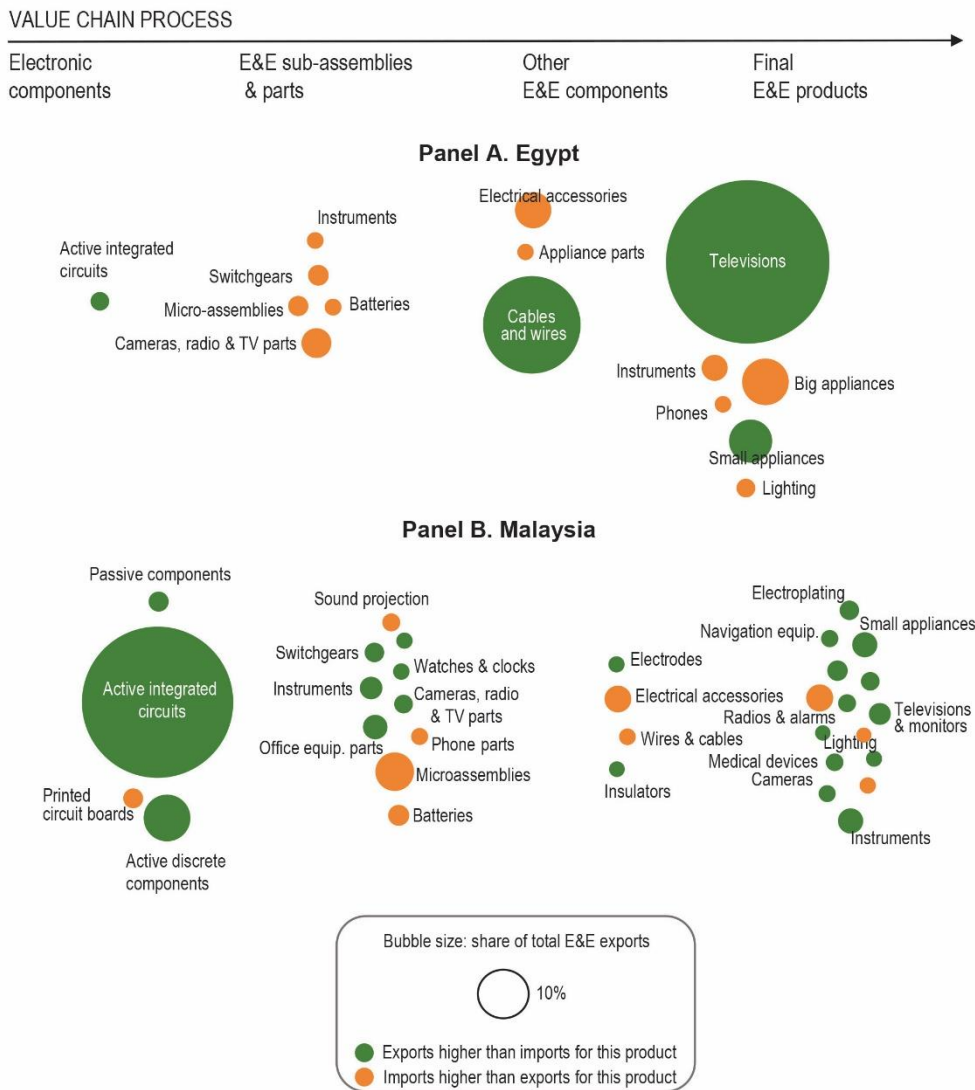
**Figure 3.7. Egypt's top 10 export destinations and import sources for E&E, 2018-20**



Source: Authors' elaboration based on UN Comtrade (2021<sup>[2]</sup>), Database, <https://comtrade.un.org/data>.

Egypt participates in value chains by manufacturing and assembling consumer products, which account for 63% of E&E exports (Figure 3.8). Typically, producers in the E&E value chain reap higher value when they are specialised in upstream segments that are complex and require high technology and skills, such as integrated circuits. Assembling these into final products is a less sophisticated process that can take place in a higher number of locations worldwide. The high share of final product exports suggests that Egypt connects to value chains downstream, at the end of the assembly process. Egypt mainly exports televisions (42% of E&E exports), whose export value has increased by ten times since 2012, while big and small domestic appliances (where Egyptian production is concentrated and where domestic brands are active) account for 17% of the total. Further upstream, Egypt exports wires and cables, which generate a quarter (23.6%) of total exports. Egypt exports few sophisticated upstream components, such as integrated circuits (ICs) (chips), and sub-assemblies for E&E, such as panels. In contrast, Malaysia has become a big value-chain participant by tapping into more-upstream segments. In Malaysia, ICs account for 44% of total E&E exports, and other types of electronics components reached 12.8%; these go to other countries to be assembled into final products. In addition, Malaysia exports more product categories along the value chain, with 33 products accounting for more than 0.1% of total Malaysian E&E exports, double with respect to Egypt's 15. The variety of exports is an indication of the more diverse ecosystem and existing expertise across a number of fields in Malaysia in this industry, which can be attractive for value chains.

**Figure 3.8. E&E exports from Egypt and Malaysia, by value chain segment, 2018-20**



Note: Value segment definition based on a combination and aggregation of categories found in Bamber and Gereffi (2013<sup>[40]</sup>), *Costa Rica in the Electronics Global Value Chain: Opportunities for Upgrading*, [https://gvcc.duke.edu/wp-content/uploads/2013-08-20\\_Ch2\\_Medical\\_Devices.pdf](https://gvcc.duke.edu/wp-content/uploads/2013-08-20_Ch2_Medical_Devices.pdf) and Frederick and Gereffi (2016<sup>[41]</sup>), *The Philippines in the Electronics and Electrical Global Value Chain*, [https://gvcc.duke.edu/wp-content/uploads/2016\\_Philippines\\_Electronics\\_Electrical\\_Global\\_Value\\_Chain.pdf](https://gvcc.duke.edu/wp-content/uploads/2016_Philippines_Electronics_Electrical_Global_Value_Chain.pdf). Only product categories with more than 0.1% of exports are included for visibility purposes. Data for Malaysia are for 2017-19.

Source: Authors' elaboration based on UN Comtrade (2021<sup>[2]</sup>), *Database*, <https://comtrade.un.org/data>.

Home-grown E&E brands have emerged in E&E in Egypt (Box 3.7). Several firms – such as Unionaire, Universal and Fresh Electrics – have tried to capture the lucrative home-appliance market, where demand grows with increasing incomes and urbanisation. Some firms are assembling smartphones domestically, such as SICO. The emergence of these Egyptian players together with foreign subsidiaries has led to a relatively large number of medium- and large-sized firms in the sector, both in relation to other sectors within Egypt and with respect to other countries (Figure 3.9). Firms with over 50 employees make up 14.5% of the total in electronics manufacturing and 11% in electrical, similar to motor vehicles and beverages, and far higher than the manufacturing total of 1%. The sector average of 12% brings the country in line

with Finland and Brazil in terms of firm structure, but still far from Switzerland (23%), and lower than Austria, Germany and the United States (all between 15%-16%), where medium-sized firms have been historically able to flourish.

### **Box 3.7. Egyptian businesses in E&E have developed their own brands**

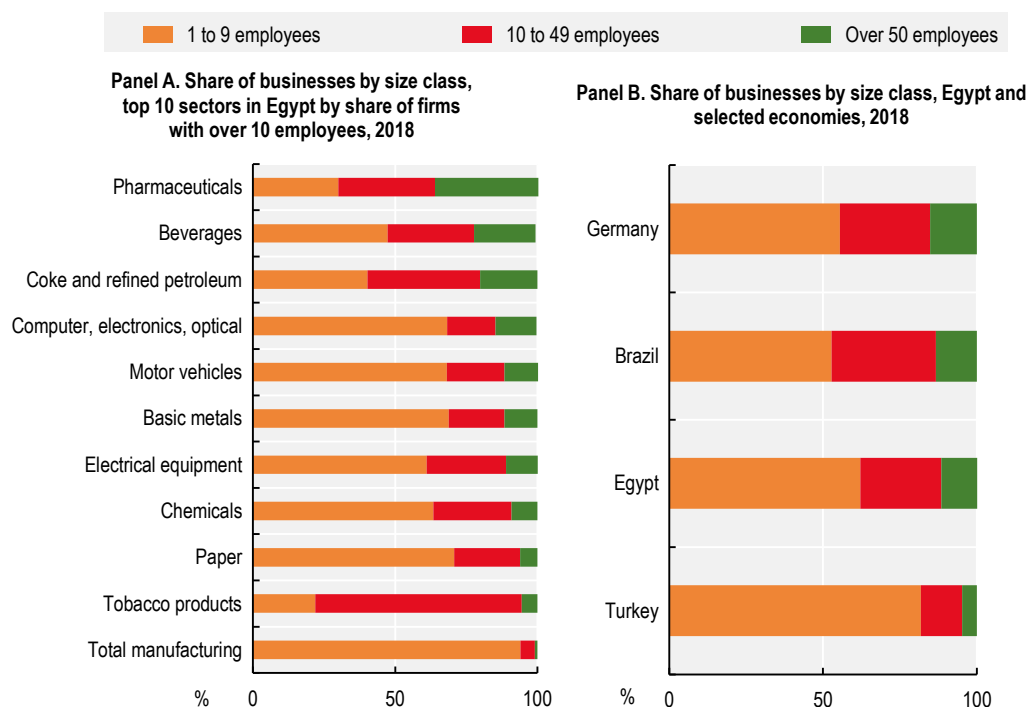
SICO Technology is a telecommunications manufacturer headquartered in Cairo, Egypt, providing technological devices and solutions. The company was set up in 2003, building on decades of experience of trading electronics by its parent group, El Sayed Salem Group. Now the firm is the first producer of 4G handsets in Egypt under its own brand, Nile X. SICO Technology has offices in Africa and the Middle East (Cairo, Egypt; Nairobi, Kenya; Dubai, UAE) and exports 25% of its production. The company has production facilities in Cairo and also in the New Assiut Technology Park. MCIT is a shareholder in the company.

Elsedewy Electric was founded in 1938 as a trader of electrical cables, but is now one of the biggest manufacturers in Egypt and Egypt's sixth-largest firm by market capitalisation. The company started out as the sole manufacturer of cables in Egypt in the 1960s and then used that knowledge to establish its own cable manufacturing business in 1984. Now Elsedewy produces electrical components (e.g. transformers) and carries out power generation infrastructure work, with about 17.5% of its revenue coming out of exports in 2019. It has six subsidiaries in Africa and the Middle East.

Unionaire is a home appliances maker founded in 1995 and headquartered in 6th October industrial zone. Unionaire manufactures, distributes and exports air conditioners and other home appliances products. The firm exports to 70 countries, mainly in Africa and MENA.

Source: Company reports and interviews.

**Figure 3.9. Medium and large firms make up 12% of total in Egypt's E&E, compared to 1% in total manufacturing**



Note: The Egyptian census counts establishments, whereas the OECD Structural Business Statistics collects information on enterprises; this may lead to discrepancies. Data for Ireland, Spain, Turkey and the United Kingdom are for 2017, United States for 2015 and Brazil for 2014. Source: Authors' elaboration based on CAPMAS (2018<sup>[9]</sup>), *The results of the fifth 2017/2018 Economic Census*, [https://www.capmas.gov.eg/Pages/Publications.aspx?page\\_id=7195&Year=22986](https://www.capmas.gov.eg/Pages/Publications.aspx?page_id=7195&Year=22986) ; and OECD (2021<sup>[42]</sup>), "Structural business statistics ISIC Rev. 4", *Structural and Demographic Business Statistics* (database), <https://doi.org/10.1787/8e34f7e7-en> (accessed on 20 January 2021).

### **Targeted policies, talents and market potential have been behind the emergence of E&E in Egypt**

Four main factors explain the rise of E&E in Egypt:

- **A sizeable talent pool in relevant subject areas.** Egypt's tertiary education has been an asset for the E&E industry. While it is difficult to judge educational quality, various world rankings are often used for this purpose by prospective students and policy makers looking to boost the image of their educational institutions and compete for talent (OECD, 2019<sup>[43]</sup>). One of these is the QS World University Rankings, produced by a UK-based consultancy. According to this ranking, Egypt's universities hold a top position in Africa in relevant subject areas, such as electrical and electronic engineering and computer science, with three universities among the world's top 250 in the former and one in the latter (Table 3.2). Graduates from these universities have been the force behind the development of some of Egypt's innovative technology firms in the E&E industry (TechCrunch, 2017<sup>[44]</sup>). A survey of 200 tech firms by Endeavor Analytics and MC Egypt in 2014 found that a third of the firms had at least one founder that attended the American University of Cairo (17%), Ain Shams University (16%) or Cairo University (9%) (Endeavour Insights and MCEgypt, 2015<sup>[45]</sup>).

Nevertheless, there is room for improvement. In the QS ranking, Malaysia, despite having a population nearly three times smaller than Egypt, has two universities in these subject areas in the top world 100 (Universiti Malaya and Universiti Teknologi Malaysia) and another 10 in the top 500.



Moreover, Egypt is also facing skill shortages in some areas and a brain drain in others, indicating that in the future the talent pool may not be able to sustain the industry's further development and upgrading.

One area for improvement is technical and vocational education (TVE). Overall, despite tertiary graduates facing the highest unemployment in Egypt, students have a higher preference for choosing colleges instead of TVE, which is associated with a lower social status (Álvarez-Galván, 2015<sup>[46]</sup>; Jemalli and El-Hamidi, 2018<sup>[47]</sup>). Creating targeted, future-oriented TVE programmes that cater to the emerging needs of the E&E value chain could boost the country's competitiveness. This would require strong collaboration between bodies in charge of industrial development, the Ministry of Education that is overseeing TVE programmes, and the private sector to ensure that programmes reflect on-the-ground needs. In addition, talent development also needs to target higher-end and specialised skills, such as materials development and chip design. Stronger linkages between the E&E industry and local universities and international collaboration with diverse technology providers, from academia to private sector, would be key to strengthening capabilities in this respect, particularly for more advanced technologies. For example, the Interuniversity Microelectronics Centre (IMEC) in Belgium, which is a top research and innovation hub in nanoelectronics and other digital technologies, was a key partner in developing SilTerra, a chip maker in Malaysia. IMEC needed a chip designed for a DNA-sequencing machine, and through technology collaboration with SilTerra, the latter was able to expand local skills by making chips tailored to life sciences.

**Table 3.2. Universities in Africa in QS top-1 000 world universities and their world ranking, by subject area, 2020**

World ranking	Electrical and electronic engineering	Computer science and information technology
151-200	Cairo University (Egypt)	Cairo University (Egypt)
201-250	Ain Shams University (Egypt) Alexandria University (Egypt)	
251-300	University of Pretoria (South Africa)	
301-350	University of Cape Town (South Africa)	Ain Shams University (Egypt) Alexandria University (Egypt) University of Cape Town (South Africa)
351-400	The American University in Cairo (Egypt)	The American University in Cairo (Egypt)
401-450	Stellenbosch University (South Africa)	
451-500	University of Witwatersrand (South Africa)	University of Pretoria (South Africa)
501-550		Stellenbosch University (South Africa)

Source: Authors' elaboration on QS (2020<sup>[48]</sup>), *World University Rankings*, <https://www.topuniversities.com/university-rankings>

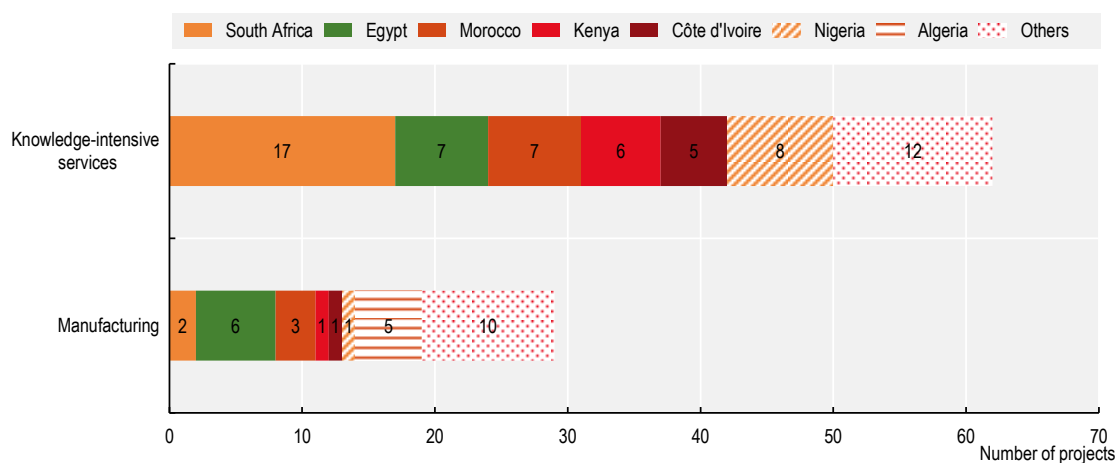
- **A growing emphasis on attracting foreign investments and encouraging exports.** Egypt is among the key players in this emerging industry in Africa. Africa attracted 29 manufacturing projects and 50 knowledge-intensive service projects in E&E during 2017-20 (through July 2020). In manufacturing, Egypt attracted the most in the continent (6 projects) during this period, while in knowledge-intensive services it ranked second.

Foreign investments in the industry increasingly eye Egypt as a regional export hub for consumer electronics. Investments by Samsung and LG in recent years have expanded the country's production and export of televisions, while some Chinese investors, such as Transsion, are focusing on smartphone production and have started to see Egypt as a hub for regional production (Egypt Independent, 2019<sup>[49]</sup>; Daily News Egypt, 2018<sup>[50]</sup>). However, the number of FDI projects in E&E going to Africa, and Egypt within it, is small with respect to the global industry. Mexico alone attracted 47 manufacturing projects and 39 knowledge-intensive service projects during the same period. Moreover, the overall engagement of the country with global value chains is low, restricting

opportunities for fast growth and learning to operate in global markets (Figure 3.10). The share of foreign value added (FVA) in total exports was 20% in Egypt, compared to 40.83% in Malaysia and 60.3% in Viet Nam, according to calculations based on the UNCTAD-Eora Global Value Chain Database.

### Figure 3.10. Egypt is among the top 2 hubs in Africa for FDI in E&E

Number of greenfield FDI projects in E&E in Africa, by type, 2017-20



Note: Knowledge-intensive services include research and development (R&D), headquarters and business services.

Source: Authors' elaboration based on Financial Times (2021<sup>[14]</sup>), *fDi market database*, <https://www.fdimarkets.com>

- A large domestic market with linkages to nearby fast-growing regions.** Not only is Egypt's population large (just over 100 million people), but the country is also located within fast-growing markets, such as Africa and the Middle East. According to data gathered by Kearney (2020<sup>[51]</sup>), total retail sales in Egypt reached USD 115.5 billion in 2019, similar to Nigeria and Malaysia. The latest figures for the market of E&E are from 2016, when it reached some USD 10.4 billion (8% of the total retail market); about one-fourth of this is spent in Cairo (CAPMAS, 2018<sup>[52]</sup>). The growth of e-commerce in Egypt is also fast and could boost E&E. Total sales in 2017 reached USD 1.6 billion dollars, up from USD 1.1 billion in 2014, reaching a penetration rate of 2.5%. For Egypt and Gulf Cooperation Council Countries, E&E was the top e-commerce category, accounting for 16%, particularly mobile phones (Bain & Company and Google, 2019<sup>[53]</sup>). Higher demand for E&E can also stimulate output growth from other industries, resulting in multiple benefits for the local economy (Box 3.8).

#### Box 3.8. Output multipliers in Egypt's manufacturing industries

The output multiplier measures how much overall output changes in the economy on account of a change in demand. Estimates by the Ministry of Trade and Industry and the Industrial Modernization Center in Egypt show that E&E have some of the highest output multipliers in the country. An increase of USD 1 in final demand for electronics increases overall output in the local economy by USD 1.98 in Egypt, while USD 1 in electrical equipment does so by USD 1.88 (Table 3.3).



**Table 3.3. Top 10 sectors in Egypt, by size of output multiplier**

Industry	Output multiplier
Motor vehicles, trailers and semi-trailers	1.99
<b>Computer, electronic and optical products</b>	1.98
<b>Electrical equipment</b>	1.88
Machinery and equipment	1.77
Rubber and plastics product	1.71
Transport equipment	1.70
Textile	1.67
Basic pharmaceutical and pharmaceutical preparation	1.62
Paper	1.62
Basic metals	1.57

Source: MTI and IMC based on CAPMAS, Input-Output tables 2014/15.

- A targeted policy for E&E.** Egypt prioritises the development of the E&E industry through targeted policies. The 2016 Industry and Trade Development Strategy (ITDS), elaborated by the Ministry of Trade and Industry (MTI), highlights engineering industries (an industrial grouping that combines E&E, machinery, metals manufacturing and automotive). The National Strategy for Science, Technology and Innovation 2030 also highlights the need to create local capabilities in production of science and knowledge in several sectors, including in E&E. In addition, Egypt launched in 2017 the Presidential “Egypt Makes Electronics” (EME) Initiative, led by the Ministry of Communications and Information Technology (MCIT) (Table 3.4). The aim of this initiative is to boost exports in electronics and electrical (E&E), reduce import dependency and foster job creation. The initiative has two focuses: enabling the design and production of electronic circuits to take place in Egypt, and fostering a manufacturing industrial ecosystem with a focus on employment creation. It is also looking to boost investments in start-ups that are working on Industry 4.0, IoT and electronics design.

**Table 3.4. The “Egypt Makes Electronics” Initiative, 2020**

Programme	Description	Financing	Conditionalities	Results
Innovative Designs Empowerment	For the design of electronic products and components that are ready for mass-production.	Up to EGP 5 million (co-financing)	Applicants have proof-of-concept published in journal or in a patent, or have promising results or a working prototype	Under implementation
Start-up Support	ITIDA-EME will partner with private sector to support start-ups through acceleration and incubation services.	Total value of fund EGP 0.5-2 million for 0.5-2 years in exchange for 2-4% start-up equity	Start-ups that operate in electronics design, Industry 4.0 manufacturing, IoT systems	Innoventure and AUC Venture Lab were selected
Co-investment Partnership	ITIDA-EME will partner with private sector to finance and grow innovative start-ups.	2:1 first investment, up to EGP 4 million by ITIDA-EME and 1:1 up to EGP 1 million as follow-up. 60% profit share with partner	Start-ups carry out key activities locally (R&D, design, manufacturing). Less than five years old, not subsidiary or JV and has proven innovative potential	Innoventures was selected
Industry 4.0 Implementation Program	Phase I targets providers of IT and technology training, assessment and consulting services for Industry 4.0 that can support selected domestic E&E manufacturers.	Not available	Up to 5 domestic E&E manufacturers selected	Under implementation

Electronics Innovation Complexes Program	Three established: At TIEC in Smart Village, at New Borg ElArab Technology Park, and at New Assuit Technology Park. Operators will finance, maintain, upgrade and manage the three parks, which all have co-working spaces, IoT labs, Fab Labs and PCB Labs.	Each park receives EGP 1.5 million in annual funding	Not applicable	Consortium of SudoTechs, NU, Techne and Med Angels; Idea Space San3aTech and EITESAL
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Source: Authors' elaboration based on Egypt Makes Electronics webpage (<http://www.makeelectronics.eg>) and Yasser (2020), "Industry Digital Transformation", ITIDA, presentation at the Third PLG e-Meeting of the PTPR of Egypt, held virtually, 10 September.

In addition to the overall incentives for manufacturing in Egypt, firms in E&E benefit from targeted support. ITIDA runs an export development programme for ICT exporting firms. Since 2010 the ITIDA subsidy has supported more than 185 companies with more than EGP 350 million (MCIT, 2020<sup>[54]</sup>). In addition, the electronics design automation (EDA) programme by TIEC (Technology Innovation & Entrepreneurship Center) during 2015-18 financed between 50% and 95% of the cost of EDA tools for SMEs for the design of circuit boards and semiconductors. Support for start-ups in the E&E industry is provided by private venture capital through the EME programme, operationalised by ITIDA (Table 3.4). ITIDA also finances research and co-operation between academia and the private sector (financing of up to EGP 1 million for developing a prototype and up to EGP 2 million for the commercialisation of a product).

### ***E&E has potential to continue growing***

The E&E industry is expected to be a fast-growing one in the post-COVID-19 industrial landscape, shaped by growing demand from existing and new consumers, new opportunities opened up by Industry 4.0, and growing integration between digital and industrial components. The traditional approach to fostering industrial development in E&E in Egypt would benefit from an update which looks more at the overall value chain in terms of changing needs, opportunities for value generation and capture, and the job-creation potential of the various stages and agents involved in the production process in Egypt, Africa and globally (Box 3.9).

- Aligning FDI attraction and domestic industrial capabilities** could be strengthened to ensure that FDI not only delivers quality jobs, but that it serves as a gateway for domestic industrial capability development. At present, support is fragmented and driven by the different institutions, each targeting specific agents in the value chain. For example, MTI, IMC and the Engineering Export Council work closely with stakeholders across the chain (e.g. electrical equipment makers, component makers and assemblers), while MCIT and ITIDA also target some upstream players (e.g. semiconductor designers and manufacturers), ICT start-ups, and telecommunication and some electronics manufacturers (e.g. those engaged in making computers and phones). Meanwhile, GAFI also plays a big role in attracting foreign investors. Ensuring that support is harmonised and that mechanisms exist for players across the value chain to interact and network with each other will be important – particularly in an era of technological convergence, where combining capabilities across different fields in E&E will be important. In Malaysia, for example, in addition to ministerial councils, implementation is facilitated by the fact that the responsibilities for developing the E&E manufacturing value chain have been brought under one roof. The Malaysian Investment Development Authority (MIDA) has a directorate that is responsible for increasing both domestic and foreign investments in the industry. Local agencies (e.g. industrial park operators/managers and local development agencies) act as co-ordinators and facilitators, helping firms ensure they have access to all support available. While "one-stop shops" have been established in Egypt to simplify business licensing, more is needed to ensure the support is

continuous over the lifetime of the business and that adequate advisory and financial support is offered to firms in their expansion phase.

- **Building trust and prioritising and signalling quality.** Tapping into the potential African market and developing a denser continental E&E value chain requires building trust and increasing competitiveness. Competition in the E&E value chain is fierce, particularly from low-cost and already trusted exporters outside Africa. Initiatives such as the ones already in place by the EEC that organise trade missions and collective participation to trade fairs should be continued and expanded where possible, in an effort to increase interactions with the African market and identify new opportunities. A quality infrastructure system that meets the needs of this sector by offering local reliable and accessible testing and certification services will be crucial in enabling Egypt to further develop the industry.
- **Increasing the efficiency of logistics.** The E&E value chain is particularly trade-intensive and even small changes in logistical costs can make a big difference in product competitiveness. Access to both port and airport infrastructure close to production and export sites is crucial, as high-value components can often travel via air cargo. The importance of air cargo is demonstrated by its resilience during COVID-19. The active fleet of air cargo globally dropped by 22% in February 2020 compared to 2019, but subsequently increased by a monthly average of 5% during March-December (ICAO, 2021<sup>[55]</sup>). Increasing the density of connections is also important for reducing time to production. Finally, the need for multiple component imports for exported products means that simplifying import procedures is necessary, beyond the SEZs.

### Box 3.9. Harnessing trade integration to boost industrial upgrading: E&E in Malaysia

Since the 1970s, when Malaysia built the first free-trade zone in Penang, the country has looked to leverage export-oriented investments in E&E manufacturing to create jobs and upgrade industrial capabilities. Malaysia's strategy in this respect has consisted of three dimensions that have reinforced each other to create positive synergies:

- *Reducing barriers to exports and imports for E&E.* Malaysia has worked to build a thick network of agreements. The country has seven bilateral free trade agreements (FTAs) in place (Australia, Chile, India, Japan, New Zealand, Pakistan and Turkey), is a member of six regional FTAs through ASEAN – with China (2003), Korea (2006), Japan (2009), Australia and New Zealand (2010), and India (2010) – and is a member of the ASEAN Trade in Goods Agreement. Malaysia is also a member of the Regional Comprehensive Economic Partnership (RCEP) and has signed the Trans-Pacific Partnership Agreement (TPPA) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP).
- *Implementing a policy mix to encourage increasingly sophisticated investments in E&E.* Malaysia has historically used a large array of fiscal incentives to incentivise investments in E&E and other promoted manufacturing and service activities.
  - New incentives have been introduced over time to progressively encourage more sophisticated activities. In 1958, Malaysia introduced the Pioneer Status incentive (a tax exemption for promoted industries), which now grants a tax exemption of 70%-100% for 5-10 years; and since 1968 it has granted a tax investment allowance for firms that cannot benefit from Pioneer Status. In the 1980s the country added tax allowances for in-house R&D expenditures. The Multimedia Super Corridor (MSC) status was also introduced in the mid-1990s, providing tax exemptions of up to 5 years for ICT firms that develop or use multimedia technologies. An automation capital allowance was introduced in 2015 to encourage a shift away from labour-intensive activities, and a tax exemption for intellectual property income (up to 100% for up to 10 years) in 2019.

- Special funds have been introduced to strengthen investments in strategic areas. In the late 1990s a Technology Acquisition Fund was launched, funding expenditures of up to RM 4 million, followed by the High Impact Fund, a matching grant for R&D and training activities. Efforts in this direction were renewed with the Domestic Investment Strategic Fund launched in 2012 with a size of RM 1 billion (approx. USD 324 million) to provide 1:1 matching grants to firms engaging in R&D, training, modernisation or upgrading of facilities, licencing or purchasing of new/high technologies, and obtaining international standards and certifications.
- The requirements for obtaining fiscal incentives were progressively made stricter. For example, before 2012 the Pioneer Status was available to firms operating along the entire E&E value chain. After 2012, this was restricted to semiconductor design and fabrication, advanced displays, equipment for digital convergence and other advanced components and equipment. Moreover, the incentive is higher for high-technology firms, which are defined as those with at least 7% of their workforce being science and technology (S&T) graduates and at least 1% of gross sales devoted to R&D.
- *Building long-lasting channels of communication with the private sector.* Malaysia's E&E industry began with a factory built by Intel in 1972 in Penang that assembled semiconductors. From an initial staff of 100, the firm has grown to employ 9 000 people today. The work of MIDA (Malaysia Investment Development Authority) and PDC (Penang Development Corporation) was essential in winning over Intel and convincing the company to consider Malaysia over other locations in Southeast Asia. Since, then, the two institutions have been building informal communication ties with foreign investors in Penang and elsewhere in the country to ensure that the physical infrastructure continues to be updated in line with global trends in the industry and that the policy mix stays attractive in a competitive global environment.

Source: Cayzer, Rob (2020), "The Malaysian Experience in Electrical and Electronics (E&E) sector", MARA Corporation, presentation at the PTPR of Egypt Government-Business Roundtable on the Future of E&E in Egypt, held virtually on 16 July 2020.

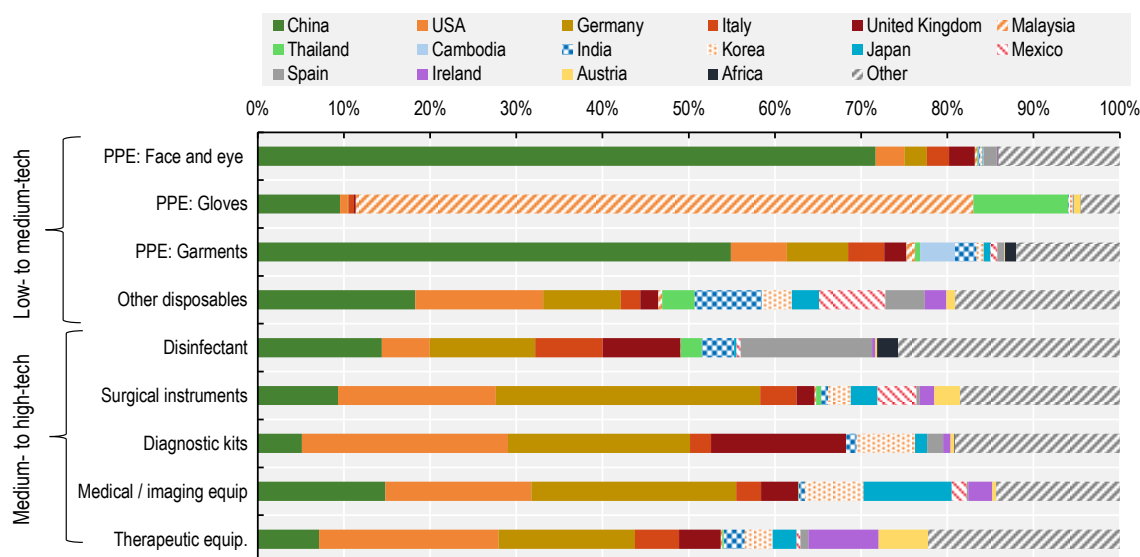
In addition to the above, new opportunities are emerging for some E&E segments, such as the medical device industry, which includes electro-medical goods and other medical supplies (Box 3.10). Medical devices face similar challenges to the E&E industry as a whole as the industry moves towards greater digitalisation, but also unique ones that stem from their role in protecting human health and the need for high regulatory oversight (Box 3.11). In this context, Egypt would benefit from actions to link businesses to the growing regional and global markets, ensure quality and conformity to standards and harness linkages along the value chain.

- **Tapping into the benefits of the continental markets.** The ongoing COVID-19 pandemic is strengthening the need to develop continental supply chains in medical devices to increase resilience (Box 3.10). Africa is a marginal market for medical devices, with the continent accounting for roughly 2% of total global revenues in medical devices. The difficulty of sourcing needed medical equipment and supplies increased exponentially during the pandemic – a major risk for a continent that is home to 17% of the world's population. And apart from Tunisia and Morocco, which are the continent's top exporters of protective garments, all countries in Africa, including Egypt, are net importers of Personal Protective Equipment (PPE). 65% of PPE in Egypt come from two countries (Malaysia and China in 2018-20), with Malaysia being the main glove source and China the source of protective garments, masks and visors (Figure 3.11). Egypt is also dependent on imports of high-tech medical devices such as medical and imaging equipment and therapeutic equipment, from x-ray machines to ventilators and implanted devices. In these medium-to-high-tech segments, imports are sourced from advanced economies, such as Germany (19.4%), and

the United States (16.9%). In terms of exports, Egypt was the fourth largest exporter of PPE in Africa, accounting for 6.4% of the continent's total during 2017-19, after Morocco, Tunisia and South Africa.

**Figure 3.11. China, Germany and Italy supply 59% of Egypt's PPE, 2018-20**

Share of Egyptian imports, by country and PPE/device category (% of total imports)



Note: PPE: Personal Protective Equipment. PPE and disinfectant HS codes follow WCO (2020), *HS classification reference for Covid-19 medical supplies*, 2nd Edition, [http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/covid\\_19/hs-classification-reference-edition-2\\_en.pdf?la=en](http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/covid_19/hs-classification-reference-edition-2_en.pdf?la=en). Medical devices follow the classification of (Bamber and Gereffi, 2013<sup>[40]</sup>) and (Torsekar, 2018<sup>[56]</sup>).

Source: Authors' elaboration based on UN Comtrade (2021<sup>[27]</sup>), Database, <https://comtrade.un.org/data>.

- Investing in safety and quality.** Even the simplest medical devices can have large consequences on human health and this increases the requirements for such products to be reliable and safe for human use. Expanding and improving the quality infrastructure system to provide fast and low-cost access to the full range of testing and certification needs for both the local and the export market is crucial. Given the increasing digitalisation of medical devices, this will also necessitate co-operation across the quality infrastructure system and potentially the development of new services to meet this demand. Adapting the policy mix to incentivise investments in quality in innovation by medical device makers could also help unlock their potential (see Chapter 2).
- Improving linkages along the value chain.** As the medical device sector moves towards greater digitalisation and the incorporation of more electronic and ICT technologies in final products, Egypt could look to boost linkages and co-operation with E&E players and start-ups. For example, exploring joint actions, such as networking and match-making initiatives, by respective business associations could help in this regard. Aligning policies that support E&E as a whole with those that support medical devices and ensuring that E&E actions also take into account the specific challenges faced by electromedical firms will also be important to create synergies. In addition, linkages could also be strengthened with the cotton and chemicals value chains to develop products that rely heavily on these as raw materials, such as face masks and other PPE. Malaysia, the world's top surgical glove exporter, leveraged its ample rubber resources and built capabilities in rubber-based goods by investing in institutions and partnerships to increase value addition. For example, the Malaysian Rubber Board and the Rubber and Plastics Institute Malaysia conduct R&D along the rubber value chain, from crops to processing and derivative materials and products.

### Box 3.10. The global medical devices industry and pandemic preparedness: An opportunity for developing continental value chains in Africa

Before the pandemic, the global demand for medical devices was driven by developed economies with high levels of health expenditures and aging populations. The United States was the largest market (43%), followed by Europe (27%) and Japan (7%) (MedTech Europe, 2020<sup>[57]</sup>). Developing and emerging economies accounted for a smaller portion of the global market, but they still represent an important growth opportunity for the sector. In particular, demand in large emerging economies, including Brazil, China and India, shows double-digit growth since 2005 as a result of expanding and aging middle-class populations, more health insurance, and increased national healthcare expenditures (US International Trade Administration, 2016<sup>[58]</sup>).

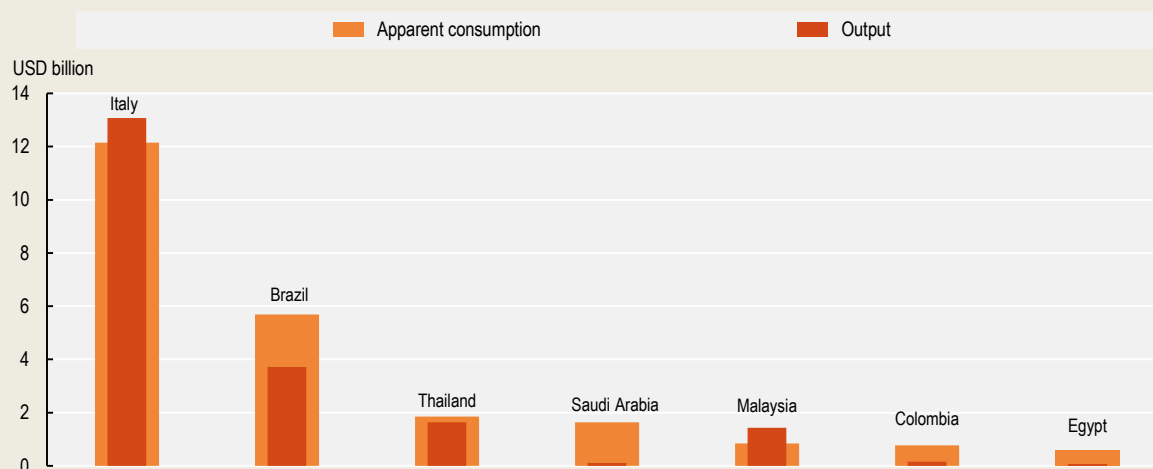
The industry is highly concentrated, with five companies accounting for 60% of global market share in 2018. These companies invest heavily in R&D activities that fuel new prototypes and products. In 2018, J&J Medical Devices and Medtronic, the two largest medical-device companies in the world, invested USD 11 and 2.4 billion, respectively, equal to 11% and 8% of revenues (Medical device and diagnostic industry, 2020<sup>[59]</sup>). Leading operations such as R&D and design are usually performed in-house, whereas intermediate production stages of components are often outsourced abroad via offshoring activities. The localisation strategies depend on several factors, including the final market of reference, the scalability of production, and the total landed cost (TLC) – which includes transportation fees (both inland and ocean), customs duties, taxes, tariffs, insurance and currency conversion. For example, low-tech, high-touch products such as surgical gloves, bandages and syringes are produced in countries with competitive labour-cost advantages – like Central America and Caribbean, where in the mid-1990s US-based original equipment manufacturers (OEMs) started to move considerable production segments to Mexico, Costa Rica and the Dominican Republic (OECD/UNCTAD/ECLAC, 2020<sup>[60]</sup>).

The most recent available data show that Egypt's industrial structure in medical devices and equipment comprises 85 production plants that contribute USD 195 million in total value added (1.31% of total manufacturing value added). Likewise, the apparent consumption of such products (production plus imports minus exports), a proxy for domestic demand, is USD 575 million. Malaysia and Thailand, with 1/3 and 2/3 of Egypt's population, respectively, have larger domestic demand (USD 1 430 million and 1 630 million, respectively) and production capacities as much as 20 times bigger (Figure 3.12).

Over the years, these countries have developed domestic industrial capabilities as part of national industrialisation strategies in parallel with large public and private investments in new hospital facilities and medical infrastructures that back demand for more sophisticated medical treatments. For example, in 2015 the government of Malaysia designated the medical device sector as a “high growth potential” industry within a five-year strategic economic plan for 2016-20 that also envisaged the achievement of universal access to quality healthcare (EPU, 2015<sup>[61]</sup>; US International Trade Administration, 2016<sup>[58]</sup>). The average health expenditure per capita in Malaysia is USD 247, whereas in Egypt it is USD 106 – above the regional average of USD 85, but below other leading countries in the region such as South Africa (USD 499) and Tunisia (USD 250).



**Figure 3.12. Apparent consumption and output in medical devices and equipment, Egypt and selected economies, 2017**



Note: a) Apparent consumption is the result of total output + imports - exports. b) Data for Egypt and Malaysia refer to 2016. c) The analysis covers the following ISIC Rev. 4 classes: 2660 Manufacture of irradiation, electromedical and electrotherapeutic equipment and 3250 Manufacture of medical and dental instruments and supplies.

Source: Authors' elaboration based on UNIDO (2020<sup>[62]</sup>), *Industrial Demand-Supply Balance Database*, [https://stat.unido.org/content/dataset\\_description/idsb-2021%252c-isic-revision-3](https://stat.unido.org/content/dataset_description/idsb-2021%252c-isic-revision-3).

In response to the pandemic, new solutions have been implemented to raise the continent's capabilities in PPEs and medical supplies. For example, after Medtronic released designs for one of its ventilators in March 2020 (including open-source manufacturing instructions), a state-run company in Egypt created the first locally produced ventilator prototype using Medtronic's designs (OECD, 2020<sup>[63]</sup>). Foreign direct investment (FDI) could also be a source for accumulating knowledge as well as technical and industrial competences. For example, in 2018 Sysmex, a Japanese haematology diagnostic-instruments and technology company, announced the launch of its first subsidiary in Egypt in response to increasing local demand. Similarly, in 2020 Philips invested in the city of New Cairo to set up an ultrasound training centre in collaboration with Health2All (H2A), a subsidiary of the SAMCRETE group (Financial Times, 2020<sup>[31]</sup>).

### Box 3.11. Key challenges faced by the medical devices sector in Egypt

A study undertaken by the Industrial Modernization Centre (IMC) and the Federation of Egyptian Industries (FEI) in 2007 on the development and prospects of the medical devices sector in Egypt outlined the key challenges faced by businesses at the time. Among the main issues highlighted were:

- Few linkages with the local economy, as most raw materials are imported (with the exception of some packaging materials) and feeder industries lack scale
- Low economies of scale within the firm, as most businesses are small
- Lack of well-defined standards for producers, lack of quality conformity, as well as of laboratories and defined standards for inspecting, auditing or evaluating product quality
- Low access to bank financing which increases the cost of capital
- Country image of Egyptian products is not up to potential
- Low availability of skilled labour (particularly specialised software developers)
- Absence of research and development (R&D) capabilities
- Low attraction and utilisation of foreign direct investment (FDI).

Source: IMC and FEI (2007<sup>[64]</sup>), *Egyptian Medical Equipment and Supplies Industry Development Strategy Report*, prepared by Hand-on Management Consulting in collaboration with Navigant Consulting International.

## Conclusion

Worldwide, the agro-food and E&E industries have been undergoing rapid changes, even before the COVID-19 pandemic, that have been redefining the assets needed to compete in a global market. The pandemic has accelerated some of these trends, notably a shift towards digitalisation and an emphasis on regional markets and sustainability. While the future remains highly uncertain, Egypt will need to update its traditional approach to unleash the potential of these two industries and enable them to continue growing in this new landscape. Already the country has taken some positive steps. In agro-food, the establishment of the National Food Safety Authority (NFSA) represents an advancement in fostering quality in local food production; while for E&E, policies have paid increasing attention to start-ups. Drawing on peer learning from Italy and Malaysia, the PTPR process has identified elements for a forward-looking strategy in each of the two industries, given their unique history, structure and potential. For agro-food, Egypt should focus on building and enhancing partnerships for Agro-food 4.0 to make it sustainable, inclusive and innovative; on updating branding and signalling quality; and on taking actions that will enable MSMEs to better capture the potential of a growing industry. For E&E, priority actions should include ensuring better alignment between policies and institutions (to attract FDI and build domestic capabilities), prioritising quality and building trust, increasing logistics efficiency, and tapping into the benefits of continental markets.



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## Note

<sup>1</sup> E&E encompasses products that rely on electrical and electronic technologies to function. According to the International Standard Industrial Classification (ISIC) Rev. 4, E&E encompasses the following activities:

- *Manufacture of computer, electronic and optical products*. Sub-groups include electronic components, computers and peripherals, communication equipment, consumer electronics, measuring and testing equipment and electromedical equipment.
- *Manufacture of electrical equipment*. Sub-groups include batteries, cables, motors, wires, lighting equipment and domestic appliances.





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