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Foreword

Egypt, the Arab world’s most populous country, continues to be the largest recipient of FDI in Africa with USS 7.4 billion invested in 2017. An investment law that came into force in late 2017 has helped to boost international investments and forecasts for GDP growth are increasingly positive despite the political and regional instability of the past few years. In fact, in PwC’s 2019 CEO Survey Middle East Findings, 15% of Middle East CEOs named Egypt as their leading foreign market for potential growth in 2019, with only Saudi Arabia (28%) ranking higher.

The manufacturing sector is at the forefront of the Egyptian government’s substantive plans for economic growth. The sector has been undergoing a period of growth guided by the Sustainable Development Strategy (SDS): Egypt Vision 2030 launched in 2015 and the Industry and Trade Development Strategy 2016-2020 launched in 2016. Both initiatives have a set of ambitious goals and KPIs for the manufacturing sector including increasing the manufacturing value added as percentage of GDP to 18%, increasing the manufacturing growth rate to 10%, and increasing high-technology exports as a percentage of Egyptian manufactured exports to 6% by 2030.

Egypt already has well established manufacturing sub-sectors such as food & beverage, steel, pharmaceuticals, automotive, and is well positioned to become a top destination for manufacturing globally. Its newly-expanded Suez Canal and proximity to Asian, African and European markets, low wages in global terms particularly for those wishing to use Egypt as a base for export-oriented manufacturing, and a similar time zone to the region all make it attractive for businesses. In addition, there are multiple industrial zones and special economic zones (SEZs) across the different governorates offering investors simplified taxation and customs systems.

Further, the recent projects aimed at improving and diversifying the energy supply in Egypt (e.g. Siemens megaproject connecting 14.4 GW to the Egyptian national grid and Benban Solar Park) will help significantly boost the manufacturing sector.

In this report, we have outlined three key themes that have the potential to further strengthen the Egyptian manufacturing sector going forward:

• Adopting Industry 4.0 in the manufacturing sector: Investment in Industry 4.0 will help drive industry productivity and innovation

• Developing a future-ready manufacturing workforce: Proactive action to increase the size and skill level of the Egyptian manufacturing workforce, in order for it to be future-ready

• Enabling Egyptian MSMEs and startups to scale-up to compete globally: Enabling the scaling of micro, small and medium enterprises (MSMEs) and dynamic entrepreneurship will be crucial to driving the next phase of growth in manufacturing

Manufacturing in Egypt is a vital thread in the economic and social fabric of the country. To continue its dominance in the region and effectively compete with other emerging and developing economies, Egypt must embrace the digital disruption of Industry 4.0 and prepare its workforce by equipping them with the required skills. Further, the challenges faced by domestic MSMEs need to be addressed and there needs to be strong support for their scale up, as they will be vital for decreasing the imports of production inputs and growing the overall manufacturing sector in Egypt. Although the gap between the existing capabilities and those required to seize the potential opportunities seems large, particularly in the Industry 4.0 arena, this provides many opportunities for expansion in Egypt.

“We see a positive outlook ahead for the manufacturing sector in Egypt, and its ability to bring economic vitality and positive change can transform the country into a global export-oriented manufacturing hub. The role of industry 4.0 will be critical in achieving this transformation and Egypt must prepare itself to take advantage of the opportunities on offer. This of course will require emphasis on SMEs and digital entrepreneurship, and investments in new skills and capabilities such as digitization, data analytics, 3D printing, and other innovative tools and techniques.”

Dr. Anil Khurana
GMIS Organising Committee
PwC Partner, US & ME

“This report confirms that Egypt already has many of the ingredients in place to make it a manufacturing powerhouse. The country has a huge existing manufacturing base, continues to be a favoured destination for FDI in the region, and the Government has placed manufacturing at the heart of its development plans. Fully embracing Industry 4.0, preparing its workforce with the necessary skills and supporting domestic SMEs are now the key factors required to drive the innovation and productivity in the manufacturing sector needed to allow the Egyptian economy to reach its full potential.”

Badr Al-Olama
Head of the Organising Committee
Global Manufacturing and Industrialisation Summit
A macroeconomic snapshot

With a GDP of EGP 2,104.2 billion\(^1\), Egypt experienced GDP growth of 5.3\% in 2018\(^1\), continuing to be one of the growth outperformers in North Africa. Due to ongoing reforms and an improving business climate, Egypt is expected to maintain this growth at an increasing rate, with GDP annual growth projected at 6\% in 2023\(^1\).

Real GDP growth, 2010-23 (% change)

<table>
<thead>
<tr>
<th>Country</th>
<th>2010</th>
<th>2018</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>5.1</td>
<td>5.3</td>
<td>6.0</td>
</tr>
<tr>
<td>Morocco</td>
<td>3.8</td>
<td>3.2</td>
<td>4.5</td>
</tr>
<tr>
<td>Algeria</td>
<td>3.6</td>
<td>2.5</td>
<td>0.5</td>
</tr>
<tr>
<td>South Africa</td>
<td>3.0</td>
<td>0.8</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Source: IMF

Sources of GDP Growth, 2010-2017 (% of GDP)

<table>
<thead>
<tr>
<th>Year</th>
<th>Household Consumption</th>
<th>Government Consumption</th>
<th>Investments and Inventory</th>
<th>Net Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010/11</td>
<td>19.3</td>
<td>1.8</td>
<td>8.8</td>
<td>82.0</td>
</tr>
<tr>
<td>2016/17</td>
<td>16.8</td>
<td>1.8</td>
<td>8.8</td>
<td>82.0</td>
</tr>
</tbody>
</table>

Source: The Egyptian Center for Economic Studies

GDP growth driven by household consumption

Household consumption remains the main driver of GDP growth in Egypt. On the other hand, the gap between imports and exports continues to increase \(^2\), highlighting the importance of diversifying and increasing the growth rate of exports. Also, domestic manufacturers will need to reduce their dependence on imports of production inputs in running their businesses in order to make higher profits and save foreign currency.
Diverse economy

One of the strengths of Egypt is its diversified economy and the wide range of economic activities it is involved in. Manufacturing industries contribute significantly to the country’s GDP by 16.7%.

Government pledges to develop and promote Egyptian exports

- Although economic and political instability did have a negative impact on exports, with contribution of exports to GDP falling from 21.3% in 2010 to 10.3% in 2016, 2017 saw percentage of exports recover significantly to 15.8%.
- The total exports in 2008 were worth US$53.8 billion, which fell to US$34.4 billion in 2016. This is equivalent to a 36% fall in the value of exports of goods and services over the span of 8 years.
- Manufactured goods made up 46% of Egypt’s total exports.
- Egypt’s current weak currency makes it more competitive internationally, particularly for manufacturers willing to use Egypt as a base for export-oriented manufacturing, because of lower wages and operation costs in global terms.
- Due to Egypt’s strategic location and proximity to different markets, its top five export partners are based all over the world, and not limited to mainly one continent.
- One of the five pillars of Egypt’s Industry and Trade Development Strategy 2016-2020 is ‘Export Development’. There are six programmes supporting this: a) Development of the Procedures & Legislations Regulating Exporting & Importing (EGY Trade), b) Egyptian Exports Competitiveness Enhancement, c) Improving the Standards, Quality, Inception & Control of Export and Import, d) Logistics Development, e) Activation of Preferential Agreements and Trade Facilitation, and f) Marketing and Promoting Egyptian Exports.

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GDP Breakdown by Economic Activity, FY 2017/18 (%)

<table>
<thead>
<tr>
<th>Economic Activity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing industries</td>
<td>16.7%</td>
</tr>
<tr>
<td>Wholesale &amp; retail trade</td>
<td>13.8%</td>
</tr>
<tr>
<td>Agriculture, forestry &amp; fishing</td>
<td>11.5%</td>
</tr>
<tr>
<td>Extractions</td>
<td>11.1%</td>
</tr>
<tr>
<td>General government</td>
<td>7.4%</td>
</tr>
<tr>
<td>Construction &amp; building</td>
<td>5.9%</td>
</tr>
<tr>
<td>Social services</td>
<td>5%</td>
</tr>
<tr>
<td>Transportation &amp; storage</td>
<td>4.7%</td>
</tr>
<tr>
<td>Tourism</td>
<td>2.4%</td>
</tr>
<tr>
<td>Others</td>
<td>21.6%</td>
</tr>
</tbody>
</table>

Source: Bank Audi

Key exports from Egypt, 2017 (%)

- All food items
- Ores and metals
- Fuels
- Manufactured goods
- Other

Top 5 Export Partners, 2017 (%)

1. United Arab Emirates (10.56 %)
2. Italy (8.48 %)
3. Turkey (7.19 %)
4. Saudi Arabia (5.98 %)
5. United States (5.12 %)

Source: UN Comtrade
FDI remains strong

Egypt was the largest recipient of FDI in Africa in 2017 with US$7.4 billion moving up from a position within the top five in 2016, reflecting restored investor confidence in the country. For example, there has been a large increase in Chinese investment across light manufacturing industries in the past few years. This uptick in confidence and interest for investment in Egypt can be attributed in part to the New Egyptian Investment Law No. 72 of 2017 that had the aim of promoting domestic and foreign investment by offering further incentives, reducing bureaucracy and simplifying administrative processes. According to PwC’s 2019 CEO Survey Middle East Findings, 15% of Middle East CEOs named Egypt as their leading foreign market for potential growth in 2019, with only Saudi Arabia (28%) ranking higher.

“Manufacturing in Egypt is already a leading job creator and revenue generator for the country’s economy and could play an even bigger role in the years to come. The government recognises this and has rightly made the sector a key pillar of its plans moving forward, setting a series of ambitious targets and laying out an export-led growth strategy. The introduction of a new investment law that is already making the country a more attractive destination for Foreign Direct Investment (FDI) shows how vital it is to have government support. As this report makes clear, the introduction of a roadmap for digital transformation and adoption of Industry 4.0 tools – including investment in infrastructure, education and support of SMEs – is now key to realising Egypt’s value proposition to the global manufacturing sector. And with its geographical location at the confluence of Europe, Africa and Asia making it ideally placed to serve these major markets, the potential is huge.”

Badr Al-Olama
Head of the Organising Committee
Global Manufacturing and Industrialisation Summit

*Services sector includes real estate, financial, tourism, communication sectors and other services

Source: Santander Trade
Egypt’s manufacturing value-added output increased from US$35.2 billion in 2010 to US$38.7 billion in 2017 with a +1.2% CAGR between 2010-2017. Due to Egypt’s optimal geographic location, low wages in global terms and a rapidly growing population, it is already a favourable destination for multinational manufacturers. There are key industries that are making great strides in the country and contributing significantly to the country’s GDP, such as food and beverage, pharmaceuticals, steel and automotive.

Figure 1: Egyptian manufacturing showed a +1.2% CAGR between 2010 and 2017
Manufacturing Value Added, 2010-17 (current US$ billion)

Figure 2: Manufacturing remains a central contributor to Egypt GVA
Contribution of Manufacturing to Nominal GVA, 2016-23 (% total GVA)
Figure 3: Manufacturing continues to be one of the largest contributors to employment in Egypt (11.9% in 2018) Contribution of Manufacturing to Employment, 2010-18 (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture &amp; fishing</th>
<th>Manufacturing</th>
<th>Construction &amp; building</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>8.8</td>
<td>7.8</td>
<td>7.1</td>
<td>13.0</td>
</tr>
<tr>
<td>2018</td>
<td>8.2</td>
<td>6.3</td>
<td>8.5</td>
<td>12.7</td>
</tr>
</tbody>
</table>

Source: International Labour Organization, ILO modelled estimates

Figure 4: Top 5 Industries for Value of Manufacturing Production (by selling price) for Private Sector, 2016 (EGP billion)

<table>
<thead>
<tr>
<th>Industry</th>
<th>EGP billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Electrical machines</td>
<td>229.8</td>
</tr>
<tr>
<td>2. Food production</td>
<td>92.6</td>
</tr>
<tr>
<td>3. Basal metals</td>
<td>48.2</td>
</tr>
<tr>
<td>4. Metal and other non-metallic products</td>
<td>47.5</td>
</tr>
<tr>
<td>5. Pharmaceutical, chemical, medical and medicinal plants’ products</td>
<td>42.9</td>
</tr>
</tbody>
</table>

Source: CAPMAS

Figure 5: Top 5 Industries for Value of Manufacturing Production (by selling price) for Public/Public Business Sector, 2016/17 (EGP billion)

<table>
<thead>
<tr>
<th>Industry</th>
<th>EGP billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Coke and petroleum products</td>
<td>100.8</td>
</tr>
<tr>
<td>2. Food production</td>
<td>20.9</td>
</tr>
<tr>
<td>3. Basal metals</td>
<td>13.9</td>
</tr>
<tr>
<td>4. Tobacco production</td>
<td>8.3</td>
</tr>
<tr>
<td>5. Pharmaceutical, chemical, medical and medicinal plants’ products</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Source: CAPMAS
Egypt's food and beverage (F&B) sector is largely driven by the country's rapidly growing consumer base, which has the largest population size across the MENA region. It's the fourth-largest halal food market globally, behind Indonesia, Turkey, and Pakistan. The expected annual increase in population is a strong indicator that there will be a continued demand with a healthy 15% growth in headline food sales being forecasted in 2019. According to Egypt's Export Council for Food Industries, food exports during the first half of 2018 totaled US$1.44 billion, led by frozen vegetables (US$191 million), soft drinks (US$187 million) and cheese (US$139 million). Arab countries accounted for the largest share of the exports of Egyptian food industries by 52%, worth US$753 million, followed by the EU with 15% of total exports (US$213 million). According to the Egyptian Chamber of Food Industries (CFI), there are over 7,000 food manufacturing companies operating in the country. One example of a company with high level of technology adoption is Al-Nouran Sugar, which established Egypt's first integrated complex for manufacturing sugar from sugar beets. The facility has the largest beet sugar production line in Egypt at 14,000 tonnes a day capacity.

Egypt is home to global F&B manufacturing leaders including Mondelēz, Coca-Cola, PepsiCo and Unilever.

When it comes to the steel industry, Egypt is a powerful global player, ranked 23rd in the world for crude steel production in 2017 by producing 6.9 million tonnes, a 38% increase from the previous year where it ranked 28th and produced 5 million. In terms of sales, Egypt heavily relies on rebars as those account for around 80% of all steel sales. As it's a fundamental part of almost all other industries which encourage economic growth, such as infrastructure, automotive, consumer goods and construction, the steel industry will continue to be one of the cornerstones of Egypt's economic growth. In terms of future prospects for the Egyptian steel industry, there's an expected rise in demand for building materials to support the many planned megaprojects to be launched by the government to achieve their SDS: Vision 2030 targets. An example of such a megaproject is their plan to build 1 million homes for low-income people at a cost of almost US$20 billion over the next five years.
Pharmaceuticals

Figure 8: Pharmaceutical Exports and Imports, 2017-23 (US$ million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Exports</th>
<th>Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>176.5</td>
<td>214.1</td>
</tr>
<tr>
<td>2018</td>
<td>1102.3</td>
<td>214.1</td>
</tr>
<tr>
<td>2019</td>
<td>1156.4</td>
<td>250.0</td>
</tr>
<tr>
<td>2020</td>
<td>1159.5</td>
<td>286.0</td>
</tr>
<tr>
<td>2021</td>
<td>1233.9</td>
<td>328.4</td>
</tr>
<tr>
<td>2022</td>
<td>1279.3</td>
<td>362.3</td>
</tr>
<tr>
<td>2023</td>
<td>1327.9</td>
<td>380.1</td>
</tr>
</tbody>
</table>

Source: Fitch Solutions, Egypt Pharmaceuticals & Healthcare Report, 2019; e/f= Fitch Solutions estimate/forecast

Egypt is amongst the largest markets for pharmaceuticals in the MENA region, with pharmaceutical sales forecast to grow from US$ 2.3 billion in 2018 to US$ 3.11 billion by 2023 with a CAGR of 6.0%. This industry is ‘import-dominated’ in terms of volume of raw materials used in domestic production. However, export growth is forecast to increase at a faster rate than that of imports of pharmaceuticals in Egypt, although from a much lower base. Key companies in the domestic pharmaceutical manufacturing industry include Egyptian International Pharmaceutical Industries (EIPICO), South Egyptian Drug Industries (SEDCICO), Medical Union Pharmaceuticals, Vacsera and Amoun Pharmaceuticals. Among the multinational drug makers that have manufacturing sites in Egypt are Novartis, Pfizer, Sanofi, GlaxoSmithKline and AstraZeneca. L’Oréal, the world’s largest cosmetics company, opened its first factory in the Arab world near Cairo in 2014. The state-of-the-art facility features modern technologies such as fully automated processing skids with automated recipe control, automated packing lines, and fully integrated worldwide enterprise resource planning (ERP) to optimise supply chain and quality management.

Automotive

Figure 9: Vehicle production, 2016-23 (units in thousands)

Source: Fitch Solutions, Egypt Autos Report, 2019; e/f= Fitch Solutions estimate/forecast

Egypt is one of the leading countries for the MENA region’s motor vehicle production along with Iran, Turkey and Morocco. However, with the elimination of tariffs on imported EU vehicles under the Egypt-EU Association Agreement, it is expected that local producers and assemblers will lose their competitive edge resulting in subdued growth in domestic production levels. In 2018, Minsk Automobile Plant (MAZ) of Belarus opened a production facility through a joint venture with Helwan Machinery and Equipment valued at US$ 5 million to produce heavy commercial vehicles in Egypt. Shortly after, Kia Motors and the Egyptian International Trading & Agencies Co.(EIT) signed a five-year contract worth EGP 4,240 billion to assemble Kia-branded vehicles in Egypt. Moreover, in July 2018, an announcement was made regarding initial plans of fully electric microbuses to be produced in Egypt by SMG Engineering Automotive Company production lines. There were 12 automotive producers with assembly lines in Egypt in 2018, where local components only accounted for 17% of the final product. The aim of the Ministry of Public Enterprise is to raise this figure to 46% through the revival and enhancement of a major state-owned manufacturing company, El Nasr Automotive.
The leap forward

Egypt’s manufacturing sector is expected to continue being a significant source of revenue and employment for the country. However, technological change and increased global competition are creating the need for a transformation in the nature of Egyptian manufacturing. Egypt will need to create a strong ecosystem that can spur innovation and the adoption of Industry 4.0 tools, and a manufacturing workforce of the future—a workforce that better represents its population and is able to adapt to changing needs. Moreover, MSMEs and startups must be supported and prepared to fully capitalise on the wide range of opportunities in the international market.

A young workforce, large consumer base, diversified economy, strategic geographical location with the newly-expanded Suez Canal and proximity to Asian, African and European markets, and a number of free trade agreements and arrangements are key elements which make Egypt a strong manufacturing destination.

Figure 10: Egyptian manufacturing expected to grow supported by government initiatives and partnerships
Key milestones for Egyptian manufacturing in its development

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• GSTP (1989)</td>
<td>• Launch of Sustainable Development Strategy (SDS): Egypt Vision 2030 with three dimensions: economic, social and environmental. Multiple international development partners were involved in formulating the strategy including United Nations Economic and Social Development Program to ensure alignment of the vision goals with the objectives of UN’s Sustainable Development Goals (SDGs) 27.</td>
<td>• Announcement of plans for construction of the largest textile and garment city in Egypt by 2024. It will include 568 factories with total paid-up capital of US$2 billion, covering an area of 3.1 million square meters in the Monufya governorate 29.</td>
</tr>
<tr>
<td>• GAFTA (1998)</td>
<td>• Announcement of a US$500 billion joint-investment project between Saudi Arabia, Egypt and Jordan known as NEOM in the southern Sinai Peninsula 29.</td>
<td></td>
</tr>
<tr>
<td>• COMESA (1999)</td>
<td>• Egypt and China signed deals worth US$18 billion as part of the Belt and Road initiative 30.</td>
<td></td>
</tr>
<tr>
<td>• Agadir Declaration (2001)</td>
<td>• Russia to establish US$ 7 billion Russian industrial zone in the Suez Canal Economic Zone by end of 2020 or early 2021 31.</td>
<td></td>
</tr>
</tbody>
</table>

2014

• Launch of Suez Canal Corridor Area Project which included expansion of the Suez Canal (72km of new channel and bypasses) in 2015. The mega project also includes development of the ports in Port Said and Suez, creation of an industrial zone prepared to host a number of different industries, and creation of the “Ismailia Technology Valley” 32.

2015-2016


• Announcement of a bridge linking KSA to Egypt will be built over the Red Sea which will boost commerce between the two allies. It will allow the passage of vehicles, freight, and passenger trains, as well as provide an alternative Hajj route between both countries. A cost of around US$3.4 billion was estimated for the project, but no further information has been released 33.

• Launch of a comprehensive and interactive online investment map by the Ministry of Trade and Industry including all investment opportunities nationwide 7.

Note: Solid line in graph representative of figures for Egypt’s Manufacturing Value Added, 2007-17 (annual % growth)
Source: World Bank

The future of Egypt manufacturing will be shaped by three trends:

1. Adopting Industry 4.0 in the manufacturing sector: Investment in Industry 4.0 will help drive industry productivity and innovation
2. Developing a future-ready manufacturing workforce: Proactive action to increase the size and skill level of the Egyptian manufacturing workforce, in order for it to be future-ready
3. Enabling Egyptian MSMEs and startups to scale-up to compete globally: Enabling the scaling of MSMEs and dynamic entrepreneurship will be crucial to driving the next phase of growth in manufacturing
The Fourth Industrial Revolution (4IR) or Industry 4.0 represents the next technological stage in manufacturing, which is characterised by the adoption of technologies such as additive manufacturing, advanced robotics, the Internet of Things (IoT), and Artificial Intelligence (AI). Distinct from Industry 3.0, which involved the automation of single machines and processes, Industry 4.0 involves end-to-end digitisation and data integration of the value chain. Technologically transformed setups, termed as ‘smart factories’, are able to produce higher-quality goods at reduced costs and deliver a more competitive value proposition to existing and new customers, because of agile and more efficient processes. Moreover, digitisation allows manufacturers to have greater control over processes and increases the visibility of data, whilst also enabling closer relationships between manufacturers and their suppliers and customers.

According to PwC’s Global Digital Operations Study 2018, which interviewed 1,155 executives in 26 countries, asking them primarily about their attempts to implement Industry 4.0 and the progress they are making, Digital Champions are looking for 16.2% improvement in efficiency gains and cost reductions from technology adoption, compared with 10.5% for Digital Novices.

Egypt is still at the very early stages when it comes to the adoption of smart technologies to be ready for Industry 4.0 as compared to other countries in Asia, the U.S and Europe. According to the World Economic Forum’s Readiness for the Future of Production Report 2018, Egypt is currently considered a ‘nascent’ economy, and is ranked 46th (out of 100 countries) and 3rd (out of the 13 MENA countries included) when it comes to ‘Structure of Production’, which represents the country’s current baseline of production. As for ‘Drivers of Production’, or the key enablers that position a country to capitalise on the 4IR to transform production systems, Egypt ranked 68th (out of 100 countries) and 9th (out of the 13 MENA countries). Egypt scored a particularly low score of 1.9 (out of 10 = best) for the ‘Ability to Innovate’ within the ‘Technology & Innovation’ driver.

According to UNIDO Competitive Industrial Performance Index Report, only 2.5% of Egypt’s accumulated manufacturing exports is considered to be high-tech.

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**Figure 11: Efficiency gain/cost reduction over five years, by digital maturity level**

<table>
<thead>
<tr>
<th>Digital Maturity Level</th>
<th>Efficiency Gain</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Champion</td>
<td>16.2%</td>
<td></td>
</tr>
<tr>
<td>Digital Innovator</td>
<td>14.8%</td>
<td></td>
</tr>
<tr>
<td>Digital Follower</td>
<td>10.6%</td>
<td></td>
</tr>
<tr>
<td>Digital Novice</td>
<td>10.5%</td>
<td></td>
</tr>
</tbody>
</table>

Source: PwC 2018 Global Digital Operations Study

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**Figure 12: Egypt’s Manufacturing Export Structure, 2016**

<table>
<thead>
<tr>
<th>Export Structure</th>
<th>Resource-based</th>
<th>Low-Tech</th>
<th>Medium-Tech</th>
<th>High-Tech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Tech</td>
<td>32.1%</td>
<td>32.4%</td>
<td>33.0%</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

Source: UNIDO
With the adoption of Industry 4.0 in Africa being low, Egypt can leverage the opportunity to be one of the early adopters in the region, and be at the forefront of creating advanced manufacturing systems. Egypt poses lots of opportunities given its unique strategic location and the ability to develop a powerful logistics network to become an export base between the MENA region and Europe. Moreover, Egypt has seen an improvement in energy supply in the past few years which will have positive spillovers in all sectors, especially manufacturing. For example, Siemens and its consortium partners, Orascom Construction and El Sewedy Electric, delivered a megaproject consisting of three power plants in 2018. The stations create a combined capacity of 14.4GW, generating enough energy to power 40 million people through Egypt’s national grid. As well, the Benban Solar Park is currently under construction and is set to be the largest solar installation in the world. Such projects will facilitate Egypt’s move towards Industry 4.0 as energy efficiency is a core component of its ecosystem, because the consequences of power disturbances, blackouts and poor quality power can severely impact industries across the board.

**The Way Forward**

**Focus Area A1**

**Develop a well-defined Industry 4.0 roadmap**

In order to drive industrialisation, the Ministry of Trade and Industry launched the Industry and Trade Development Strategy 2016-2020 in November 2016. Although the strategy aims to increase the use of technology and employ new technologies across the different industries, the strategy did not outline a specific roadmap regarding advancement towards Industry 4.0. Egyptian companies within the manufacturing sector are at varying levels of readiness to effectively harness Industry 4.0. They range from highly automated to heavily reliant on manpower. Therefore, for industries and companies to embark on a digital transformation journey, it is key to have a national detailed Industry 4.0 roadmap that guides them. A successful Industry 4.0 roadmap requires a dedicated, structured and multi-year approach that outlines clear goals for Egypt to achieve coupled with quantifiable and measurable targets (KPIs). Such an initiative should include stakeholders from across government entities, industries, business associations, labour groups and subject matter experts.

The roadmap has to shed light on and tackle all elements of the Industry 4.0 ecosystem (e.g. resources, suppliers, production, technology providers, logistics, customers) and raise awareness about the opportunities and challenges typically associated with Industry 4.0. In addition, the roadmap should clearly outline the projects planned to promote Industry 4.0 such the set up of cluster industrial parks, technology-focused research and development centres and innovation institutions.

For Egypt to advance through technological adoption depends decisively on the country’s absorptive capacity. Absorptive capacity is defined as the ability to identify, assimilate, transform, and use external knowledge, research and practice, and apply it to commercial ends. A poor technological absorptive capacity can be the reason why laggard countries fail to grow faster despite making major reforms. Therefore, the roadmap must, as well, outline a strategy to enhance Egyptian manufacturing companies’ technological absorptive capacity.
Focus Area A2

Leverage on leading manufacturers’ capabilities in Industry 4.0

To bridge the gap in terms of awareness of digitisation technologies, the Egyptian government should identify manufacturing companies specialising or possessing the desired capabilities of Industry 4.0 elements. These companies, which are likely to be multinational and foreign companies, could be encouraged to build Centres of Excellence in Egypt in order to increase awareness of the applications of specific technologies. Similarly, memorandums of understanding (MoUs) could be signed with these companies to help facilitate a widespread shift to industry 4.0. For example, the Ministry of Trade and Industry and Ministry of Education and Technical Education recently signed an MoU with Siemens at the G20 Investment Summit, to improve the competitiveness of Egyptian industry. Siemens will be working with the government closely to increase adoption of automation and digitalisation across the Egyptian industry by promoting system interconnection and leveraging Internet of Things (IoT) integration. Digitalisation and industry-specific trainings will also be enabled through connectivity to the Siemens MindSphere platform for cloud computing, data analytics, smart data, and cybersecurity.

Leading foreign corporations often bring in expatriates from their headquarters for managerial and highly technical roles. While this might restrict the development of local employment opportunities, it results in knowledge transfers and is likely to have a positive knock-on effect on Egyptian manufacturers in terms of skills and capabilities.

Focus Area A3

Invest in IT Infrastructure

Information Technology (IT) infrastructure is a key element for Egypt’s government to accelerate their digital transformation and economic diversification agendas. An upgrade of the technological infrastructure to ensure it is reliable, fast, connected and secure for exchange of real-time data will be critical to create a viable digital manufacturing sector in Egypt as well sustained investment in improving the quality of and access to wireless connectivity.

Egypt’s SDS: Vision 2030 sets plans for expansion of basic infrastructure including the broadband optic fiber networks and cloud computing infrastructure. One of the positive steps taken in this direction is the 2019 collaboration between Telecom Egypt and Microsoft to extend its global cloud network to Egypt. The new enhanced network presence in Egypt will connect via Microsoft’s global network to transatlantic and trans-Arabian paths, and will improve connectivity across North Africa and the Middle East. Working toward IT readiness will encourage companies to pursue Industry 4.0 and propel the Egyptian manufacturing sector shift toward the 4IR. However, along with enhancements and investments in infrastructure, it is important to recognise that new regulatory policies and standards will need to be developed and deployed to correspond to the new technologies.
Thailand’s growth has stalled in recent years, leading the government to fear that the country is stuck in a ‘middle-income trap’ where it is unable to progress due to stagnating foreign investment, slow growth and industrial stagnation. In order to overcome these challenges, the government created the Thailand 4.0 plan in May 2016, a holistic economic development programme, which aims to evolve the economy from the Industry 3.0 hard industries, whilst also addressing social issues such as inequality.

The New S-Curve industries were chosen as the likely new engines of growth based on technologies that Thailand expected will be important for its future. To expedite development, the Act on National Competitive Enhancement for Targeted Industries was introduced in February 2017 to provide incentives aimed at encouraging investments from companies that were new to Thailand or were introducing new technologies such as 3D printing to Thailand’s industrial sector. To qualify for these incentives, companies must also partner with an academic institution or a Centre of Excellence in an area to develop human resources. This was to solve the scarcity of skilled labour for the implementation of Thailand 4.0, given that only 50% of secondary school graduates progress to attend a tertiary institution and only 46% of lower secondary leavers are proficient in Mathematics.

To upskill the labour force, the government also included specific targets for improvements in education. IT infrastructure is also a major focus area for Thailand as currently 40,000 of 70,000 villages lack access to high-speed internet. On the whole, Thailand’s comprehensive approach to Industry 4.0 tackles each of these challenges to enable the country to transition towards a technologically advanced economy.

**Case Study:**
**Thailand envisions long-term growth through Industry 4.0**

Thailand’s growth has stalled in recent years, leading the government to fear that the country is stuck in a ‘middle-income trap’ where it is unable to progress due to stagnating foreign investment, slow growth and industrial stagnation. In order to overcome these challenges, the government created the Thailand 4.0 plan in May 2016, a holistic economic development programme, which aims to evolve the economy from the Industry 3.0 hard industries, whilst also addressing social issues such as inequality.

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**Industry example: Robotics as a focus for Thailand 4.0**

The robotics industry has prospered in Thailand due to the heavy reliance of the automotive and electronics sector on robotics. The robotics sector is expected to grow significantly in Thailand as a result of the Thailand 4.0 plan and the increasing level of technical expertise across industries. Thailand ranked eighth in the world for its annual robotic consumption in 2014. Thailand imported 3,657 units of robots in 2014 and the number is expected to increase to 7,500 units in 2018. The International Federation of Robotics expected employment in Robotics in Thailand to double from 7,500 in 2016 to 15,000 in 2018.

In 2015, Swedish-Swiss Robotics company, ABB opened a Robot Applications Center in Thailand with a collaborative dual-arm robot YuMi. The robot, which has applications in the food and beverage, electronics and automotive industries, can expect strong sales in Thailand as a result of the benefits provided to both Thai and foreign companies that leverage robotics. Other companies such as Nachi, Delta, Ureka Design, Daifuku and Celestica also have manufacturing facilities in Thailand.
B. Developing a future-ready manufacturing workforce

With a population of 97.6 million in 2017, Egypt has a wealth of human resources, but there needs to be continued focus on developing further capabilities in areas such as digital skills, engineering, critical thinking and others relevant for improving labour productivity. While employers in Egypt are struggling to find workers with appropriate skills, the country is also facing challenges of unemployment. In 2017, 11.8% of the Egyptian workforce were unemployed, and the unemployment rate amongst youth (15-24 years) was even much higher sitting at 29.6%. With an apparent youth bulge (people ages 15-64 account for more than 60% of the total Egyptian population) and a population projected to reach 108.1 million in 2023, the threat of high youth unemployment rises more.

According to Egypt’s Central Agency for Public Mobilisation and Statistics (CAPMAS), the second largest group of unemployed people at 34% are ‘university graduates and above’ highlighting that graduates are not well-prepared for the industry and job market.

On a global level, Egypt ranked 104 out of 119 countries in INSEAD’s Global Talent Competitiveness Index 2018. It ranked 116th in the pillar ‘Vocational and Technical Skills’, where it scored 3.37 (out of 100) for the ‘Relevance of education system to the economy’ indicator within the ‘Employability’ sub-pillar. Also, in measures of skills matching with secondary education, and skills matching with tertiary education, Egypt ranked 118th and 118th respectively. This aligns with results from the World Economic Forum’s Readiness for Production Report 2018 where Egypt ranked 95th (out of 100 countries) in the ‘Future Labor Force’ pillar and last when it comes to the ‘Quality of vocational training’ sub-pillar. Ranks from these reports signal the dire need for Egypt to foster a culture of continuous learning and implement programmes that remedy deficiencies in the skills that will be both in demand by employers and deemed strategic to Egypt’s manufacturing competitiveness. Upskilling the existing and new workforce should be a high-priority development area in Egypt, where action must be taken quickly.

Figure 13: Distribution of unemployed persons by educational status, 2017 (%)

<table>
<thead>
<tr>
<th>Educational Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>University &amp; above</td>
<td>34%</td>
</tr>
<tr>
<td>Above intermediate &amp; less than university</td>
<td>4%</td>
</tr>
<tr>
<td>Technical intermediate</td>
<td>48%</td>
</tr>
<tr>
<td>Intermediate</td>
<td>1%</td>
</tr>
<tr>
<td>Less than intermediate</td>
<td>8%</td>
</tr>
<tr>
<td>Reads &amp; writes</td>
<td>2%</td>
</tr>
<tr>
<td>Illiterate</td>
<td>3%</td>
</tr>
</tbody>
</table>

Source: CAPMAS

61.4% of total population were ages 15-64 in 2017

11.8% unemployment rate in 2017 (% of total labour force)

29.6% unemployment rate for Egyptian youth ages 15-24 in 2017 (% of total labour force ages 15-24)
The Way Forward

Focus Area B1

Create a long-term pipeline of skilled local workforce

Educational system that recognises the evolving needs of the industry

Industry 4.0 will make many jobs susceptible to automation, but will create new jobs requiring a different set of skills. Increased usage of software and data analytics amongst other digital technologies in Industry 4.0 will lead to rising demand for employees with skills such as programming, cognitive flexibility, logical reasoning, visualisation, technology & user experience design, as well as strong communication and management skills. This raises the need for industry associations to work closely with academic institutions to ensure alignment of curriculum with the latest needs of the industry.

Focus on strengthening TVET programmes for both new and existing workforce

The Egyptian government realises that the lack of skilled labour hinders economic growth. To address this, one of the five pillars of the Industry and Trade Development Strategy 2016-2020 is ‘Technical and Vocational Education and Training (TVET) Development’ with the objective of delivering a skilled workforce that addresses the labour market’s skills gaps and requirements. Projects and programmes supporting this include: TVET Graduate Licensing, National Egyptian TVET Qualification Framework (NQF) Development & Activation, Improving Social Perceptions of TVET, Enhancing the Quality of TVET Institutions, and Enhancing Private Sector Partnerships for TVET Reform. The current strategy is a step in the right direction, but it is essential that focus is not only on the future workforce but also the existing one. This means investing in training programmes to upgrade the skills of the current workforce and prepare them for the transformation, while recognising that different generations of the workforce would possess a different level of technology-readiness.

Empower women to take on roles in manufacturing

There is plenty of evidence that increased participation of women improves the innovation performance of organisations and societies. Research shows that diverse, inclusive teams are more innovative, and diverse companies are more profitable. For the manufacturing sector to thrive further, Egyptian women must be encouraged to join the sector. In 2017, the ratio of female to male labour force participation rate in Egypt was only 32.9%, and unemployment among female youth was 38.3% (% of female labour force ages 15-24) compared to 25.7% for male youth in the same age group. One way to increase the proportion of women in manufacturing is by...
is by driving a focus on Science, Technology, Engineering and Mathematics (STEM) education among women across educational levels. Ways of achieving this include enhancing engagement among girls in science classes, and increasing exposure to opportunities for female participation in manufacturing and related areas through various initiatives, such as by hiring more female science and mathematics teachers and professors. Additionally, businesses can look to implement robust corporate policies to improve workforce conditions for women, such as ensuring equal pay based on performance and merit, and the provision of maternity leave and flexible working hours for those with children.

More makerspaces

Moreover, the government must allocate funds for opening high-tech makerspaces in the different governorates around Egypt to allow Egyptian students and science enthusiasts to have access to and explore different technologies such as 3D printing, laser cutting, printed circuit board (PCB) milling, computer numerical control (CNC) machining, etc. One example of a makerspace that is making change in Egypt is Fab Lab Egypt in Cairo. The lab was founded in 2012 by young Egyptians, and is a member of the Massachusetts Institute of Technology Fab Lab global network. It is a digital fabrication lab and a community-run public makerspace where anyone can make a variety of products, from electronics to furniture and installations. School and university students, entrepreneurs and businesses materialise and prototype their ideas in the lab. Machines, tools, skills, resources and ideas are shared with the community to create new opportunities for economic and social development 56.

Partnership approach and collaboration among different stakeholders

It is important to recognise that the goal of preparing the local talent for the future of work will not be possible unless the government, academia, and companies join forces and target it collaboratively. One of the successful collaborations aimed at tackling the issue of lack of skilled labour is the one between Microsoft Egypt and the Egyptian government. Microsoft launched an initiative called “Tawar w 3’ayar” (develop and change) to bridge the skill gap in the labour market by empowering Egyptian youth to get 4IR jobs through digital competencies and building digital science capabilities. As of 2019, the initiative has provided employment opportunities to over 1.4 million youth by developing 500 centres in the 27 different governorates in Egypt. Microsoft is working hand in hand with the Egyptian authorities to create relevant job opportunities. The programme has successfully promoted 117,621 job opportunities whilst matching more than 10,000 young individuals to over 1,500 employers 57.

Additionally, in 2014, the Industrial Training Council (ITC), a body attached to the Ministry of Trade and Industry, launched a joint venture training project with UAE, called “Beaidak” (with your own hands). The project aims to equip Egyptian youth entering the industrial sector with the skills needed for success. The project includes a number of programmes, including: a) National Training Programme for Rehabilitation: provides training on electrical and electronic maintenance of factories, b) National Training Programme for Employment: provides opportunities to work in the private sector in the fields of engineering, chemicals, food, etc., c) Herafy Programme: targets youth with any disabilities, such as hearing and speech impairment, and d) The National Programme for Economic and Social Empowerment of Women: aims at training women to be able to work from home, establish a micro-project or find a job in factories and companies 7.
Siemens, in collaboration with the German Development Cooperation (giz), celebrated the inauguration of Egypt’s Zein El Abedeen School of Excellence in October 2017. The joint initiative involved developing Zein Al Abedeen Dual-system Technical School in Cairo by equipping it with a set of technological and learning solutions, developing the curriculum, and providing instructor training, to position it as a school of excellence in Egypt that can be replicated elsewhere in the country. The school lab now has 3D printers, Totally Integrated Automation (TIA) systems as well as Siemens’ Product Lifecycle Management (PLM) software. This project supports Egypt’s SDS: Vision 2030, and is in line with Siemens’ long-standing commitment to supporting dual technical education in Egypt and building a local workforce ready for the future of work.

In February 2018, Siemens announced its largest ever software grant to three of Egypt’s top universities - Cairo, Ain Shams and Alexandria. Siemens’ product lifecycle management (PLM) software solutions are being used by companies around the world. At the three universities, the PLM software will be an integral component of the engineering programmes. Over 35,000 Egyptian students will use the software for their Computer-Integrated Manufacturing, Robotics, Industrial Design, Work Design, Ergonomics, Material Science and Materials Processing courses and projects. It will enable them, among other uses, to create simulated versions of their final products instead of physical prototypes. The aim of the initiative is to allow Egyptian students to be proficient in using this world-class software, to come up with new innovative ideas.

The German government (BMZ) and Siemens, in October 2018, announced their plans to establish an occupational training center in the Ain Sokhna area with total investment of more than 22 million euros. The BMZ-Siemens training center will provide the latest technology and simulate real-life conditions for 5500 technicians and engineers over 4 years. This will help in creating a future-ready Egyptian manufacturing workforce by providing students with skills related to industrial mechanics; electrics and electronics; automation and control as well as building key competencies in the maintenance and repair of power plants and wind farms.

Case Study:
German giant Siemens prepares the Egyptian youth for the future of work via a series of initiatives

Zein El Abedeen School of Excellence

US$ 120 million industrial software grant to three Egyptian universities

Egyptian-German Technical Academy in Ain Sokhna
C. Enabling Egyptian MSMEs and startups to scale-up to compete globally

Micro, small and medium enterprises (MSMEs) and startups in any economy are seen as one of the main propellers of economic growth that can fuel innovation and job creation. Egypt has 2.5 million micro, small and medium enterprises (MSMEs), which comprise 80% of the economy and 75% of the labour force. The manufacturing sector accounts for 51.1% of these MSMEs, reflecting how MSMEs are an integral part of the manufacturing landscape in Egypt, and must be supported at all stages of production.

One of the five pillars of Egypt's Industry and Trade Development Strategy 2016-2020 is ‘Micro, Small & Medium Enterprises (MSMEs) & Entrepreneurship Development’ with the objective of increasing the MSME sector contribution to GDP. Six main programmes are mapped out to help accomplish this: a) Legislative and Institutional Development, b) The Electronic Interactive Platform for Service Provision and Decision-Making Support, c) Business Services Development, d) Encouraging Entrepreneurship, e) Facilitating Access to Finance, and f) Governance. One of the outputs that the ministry has pledged to deliver to support MSMEs development, is having a complete database for all MSMEs, including an electronic directory for communication purposes, through a customer relations management system (CRM).

According to the World Bank’s Doing Business Report 2019, Egypt ranked 120th (out of 190 countries) and scored 58.56 (out of 100) when it came to ease of doing business. This is a +2.74 change in score between 2016/17 and 2017/18. Factors contributing to this improvement in score included: starting a business made easier by establishing a one-stop shop and removing the requirement to obtain a bank certificate, and paying taxes made easier by extending value added tax cash refunds to manufacturers in case of a capital investment. However, the pillar Egypt scored the least in and the one contributing to its low rank is ‘Trading across borders’ (42.23 out of 100). This pillar includes the following sub-pillars: time to export, cost to export, time to import and cost to import. This aligns with the statistic that states that only 17% of Egyptian MSMEs manage to export. This is because MSMEs are particularly vulnerable to challenges such as increasing competition due to globalisation, especially in traditional manufacturing sectors, as well as rising input costs. MSMEs must offer unique value propositions to establish ‘non-price competitiveness’ to increase opportunities for exports and internationalisation. Additionally, decreasing the imports of production inputs will be essential for MSMEs because it is not sustainable to depend on a dollar-based cost structure with an Egyptian pound revenue streamline.

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**Figure 14: The manufacturing sector accounts for more than half of the Egyptian MSMEs**

Distribution by sector of MSMEs, %

<table>
<thead>
<tr>
<th>Sector</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade</td>
<td>40.5%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>51.5%</td>
</tr>
<tr>
<td>Food/Drink</td>
<td>1.7%</td>
</tr>
<tr>
<td>Building and Construction</td>
<td>1.6%</td>
</tr>
<tr>
<td>Health</td>
<td>1.3%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>1.1%</td>
</tr>
<tr>
<td>Other</td>
<td>2.6%</td>
</tr>
</tbody>
</table>

Source: Ministry of Trade and Industry, Industry and Trade Development Strategy 2016-2020
The Way Forward

Focus Area C1
Build MSME shared resource centres and launch mentorship programmes

MSMEs and startups face a wide range of challenges in comparison to large corporations which include limited capital, limited availability of talent, and low technology capabilities. They have fewer opportunities for testing and understanding how new technological solutions fit into their operations to determine the real value of each solution. Building MSME shared resource centres can help them to overcome these hurdles. Resource centres will provide access to Industry 4.0 tools, external knowledge, the required training, and would allow MSMEs to test, examine and apply new emerging technologies, thereby allowing them to make more informed purchases. Such centres can also encourage collaboration and knowledge exchange between manufacturing SMEs and digital technology companies. Besides, these centres can help MSMEs build connections and work closely with local universities to attract skilled talent.

Moreover, mentorship programmes can be launched to help MSMEs and startups enhance their business models and internal operations, and develop their own innovative strategy to drive growth. Such programmes will also help MSMEs with handling intellectual property rights (IPR) and data management issues. This is important because handling IPR and data management issues requires legal, cybersecurity, and technical expertise that often smaller companies are less likely to have access to.

Focus Area C2
Support, incentivise and protect domestic manufacturing

To help MSMEs with limited capital and lack of funding, the Central Bank of Egypt launched a programme in 2016 to finance 350,000 SMEs with US$22.5 billion from 2016 to 2020, and ordered banks to commit 20% of their loan portfolios to SMEs. Recently, Strategy& and Endeavor developed a “scale-ups readiness index” in their Scaling up MENA SMEs 2018 report to assess the maturity of the scale-up ecosystems in five MENA countries: Egypt, Jordan, Lebanon, Saudi Arabia, and the United Arab Emirates. Egypt had the lowest readiness score and ranked last with financing highlighted as one of the main challenges. This reflects that access to funds continues to be a chronic issue faced by Egyptian MSMEs, and hence the government and other stakeholders including banks and investors must collaborate further to fill this funding gap.

What's more, the Egyptian government must offer benefits to domestic manufacturers to help them scale-up such as preferential access to land, tax deductions for R&D and capital investments, import duty exemptions for capital equipment, etc. The government must also pay special attention to laws and regulations affecting Egyptian manufacturing MSMEs to allow them to flourish. For example, clear laws must be in place to protect local industries from overseas competition by imposing appropriate tariffs and quotas.

Focus Area C3
Leverage global platforms to facilitate strategic partnerships

Other challenges that manufacturing MSMEs face include access to customers and access to markets. Egypt’s government can help manufacturing MSMEs in formulating strong market entry strategies. This includes aspects such as evaluating the most attractive growth markets for exports, identifying new customer base and tailoring the value proposition model to customer needs. More importantly the government must look into facilitating closer links between Egyptian manufacturing MSMEs and foreign companies to allow them to reap global trade opportunities. It could also leverage its global networks and partnerships to promote and market Egyptian manufactured products and exports. Egypt’s unique geographical location with proximity to global markets and a number of free trade agreements is a strong basis for local manufacturing MSMEs to capitalise on in their quest for internationalisation.
Chinese manufacturing has been facing increasing pressure from developing countries, which can provide competitive cost advantage as well as from the developed countries where technology is driving gains in efficiency. Made in China 2025 (MiC 2025) is a Chinese government strategy, put in place by the Ministry of Industry and Information Technology (MIIT) in 2015. The aims of MiC 2025 were to “increase China’s innovation capability, quality and efficiency, integration of industrialisation and information technology and green development.” Key elements of MiC 2025 were integrated into the 13th Five-Year Plan which highlighted the importance of indigenous innovation and technological self-sufficiency. It is also part of China’s Belt and Road Initiative, with an overarching aim to evolve China’s traditional manufacturing sectors into higher value-added and quality manufacturing.

The government chose 10 industries as areas of focus including power equipment, new information technology, aerospace equipment, robotics and new energy vehicles. The government laid out specific targets in a variety of areas related to technological innovation and the growth of domestic companies. In these industries, companies would move up the value-added chain in production and innovation networks to achieve greater brand recognition.

One of the strategies encouraged by China to jumpstart technological innovation and gain international brand recognition was through mergers and acquisitions (M&A) by Chinese companies of international companies. Between 2005-2010, the industrial sector represented on average 26% of outbound M&A. In 2016, this number was 51%. Some notable acquisitions include the acquisition of GE’s home appliance division by Haier Group for US$5.4 billion and the acquisition of KraussMaffei Group by ChemChina for US$1 billion. Chinese companies will then rely on foreign companies for access to high-tech equipment for new manufacturing methods. Furthermore, they rely on the workforce that has developed their skillsets by working at foreign companies’ manufacturing facilities in China. To facilitate learning from foreign companies, the government streamlined administration and improved the ease of doing business in the manufacturing sector. Specifically, the government retained its open door to foreign participation and is considering providing foreign companies a chance to invest in Chinese manufacturers.

### Case Study: Ecosystems for supporting domestic manufacturing in China

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### Milestones for MiC 2025

<table>
<thead>
<tr>
<th>Year</th>
<th>Milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>MiC 2025 introduced</td>
</tr>
<tr>
<td></td>
<td>Labour productivity to increase by 7.5% annually</td>
</tr>
<tr>
<td>2020</td>
<td>Domestic content to reach 40% R&amp;D to increase to 1.68% of sales</td>
</tr>
<tr>
<td></td>
<td>Labour productivity to increase by 6.5% annually</td>
</tr>
<tr>
<td>2025</td>
<td>Chinese manufacturers will rank among the list of manufacturing powers</td>
</tr>
<tr>
<td></td>
<td>Domestic content to reach 70%</td>
</tr>
<tr>
<td>2035</td>
<td>Chinese manufacturers will reach a moderate level on the ranking of</td>
</tr>
<tr>
<td></td>
<td>manufacturing countries</td>
</tr>
<tr>
<td>2049</td>
<td>China will be transformed into a leading manufacturing power</td>
</tr>
</tbody>
</table>

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### Industry Example: Chinese companies set up common platform for learning

A pilot for MiC 2025 was set up in the Shanghai Lingang Industrial Area. Chinese companies from across industrial sectors such as Shanghai Electric Group, Shanghai Automotive Industry Corporation and Siasun Automated Guided Vehicles have invested in the area. Chinese companies have progressed to independently develop the capabilities to conduct robust capability sharing between themselves. The industrial park has several shared technology services for the companies to benefit from, such as the Shanghai Smart Manufacturing Research Institute, the Smart Manufacturing Big Data Centre, a technology exchange centre and commercialisation platform. The companies also have access to professional services and a cloud computing platform.
Conclusion

Egypt has a highly diverse economy with manufacturing being a key contributor to the country’s revenue (16.7% of GDP), exports (46% are manufactured goods) and employment (11.9% of workforce). Despite challenging economic conditions and political instability over the past few years, the Ministry of Investment and International Cooperation is succeeding in attracting significant levels of foreign investment which can be partly attributed to the new Egyptian Investment Law No. 72 of 2017 that focuses on expedition and facilitation of investors’ transactions. In addition, the Ministry of Trade and Industry Development Strategy 2016-2020 is driving growth in the manufacturing sector through a set of policies and projects, to achieve the strategy’s targeted goals which include increasing the annual industrial growth rate to 8%, increasing the contribution rate of industrial products to GDP to 21%, and increasing the growth rate of exports to 10% annually by 2020.

One of the most important steps for the manufacturing sector in Egypt would be to embark on a journey of digital transformation and adoption of Industry 4.0 tools. First and foremost, a national roadmap needs to be developed to support Egyptian manufacturing companies in their digitisation journey to leverage the potential offered by data analytics, cloud technology, artificial intelligence, additive manufacturing, etc. Other steps include leveraging leading companies’ capabilities in Industry 4.0 and investing in the country’s IT infrastructure. Benefits of adopting Industry 4.0 will range from improved efficiency and agility to lower costs and higher revenues. It will also allow deeper integration into the digital global economy and supply chains. However, such transition is expected to take years since the manufacturing sector in Egypt is considered to be a ‘nascent’ economy and is still in its early stages when it comes to its readiness for Industry 4.0.

A successful Industry 4.0 implementation needs a capable, well-trained and future-ready workforce to support it. Industry 4.0 will decrease the number of routine jobs but will increase jobs requiring flexible responses, critical thinking and problem-solving mindsets. Building a strong talent pipeline in Egypt to drive growth in the manufacturing sector will necessitate having an educational system that caters to the needs of the industry, strengthening TVET programmes for both new and existing workforce, encouraging more women to join the manufacturing workforce, developing more makerspaces, and strong collaboration among different stakeholders.

What’s more, it will be important to recognise that MSMEs and startups play a unique role in the Egyptian manufacturing landscape and are a critical part of it. MSMEs must have access to shared resource centres and mentorship programmes to help them address their challenges, enhance their business models and internal operations, and develop an innovative strategy to drive growth. Egyptian policymakers must support, incentivise and protect domestic production, and more importantly facilitate closer links between MSMEs and foreign companies to allow them to seize global trade opportunities.

Overall, the outlook for the Egyptian manufacturing sector is positive and the sector has significant sources of comparative advantage, in terms of large consumer base, strong growth dynamics, substantial energy reserves, and a huge pool of human resources to draw on. But to translate these advantages into economic success and realise the country’s SDS: Vision 2030, the manufacturing sector needs to be agile to adapt to the shifting nature of global technologies, economies and politics.
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