Programme for
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Industrial Diagnostic Study Zambia 2020

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List of acronyms and abbreviations

AfCFTA	African Continental Free Trade Agreement
CAGR	Compound Annual Growth Rate
CO2	Carbon dioxide
COMESA	Common Market for Eastern and Southern Africa
EQuIP	Enhancing the Quality of Industrial Policy (UNIDO/GIZ)
FDI	Foreign Direct Investments
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GTCI	Global Talent Competitiveness Index
ICT	Information and Communications Technology
IEA	International Energy Agency
IIP	Index of Industrial Production
INDC	Intended Nationally Determined Contribution (Agreement on Climate Change)
ISIC	International Standard Industrial Classification of All Economic Activities
IT	Information Technology
LCA	Latent Comparative Advantage
LMI	Lower middle-income countries
MNF	Manufacturing
MSME	Micro, small and medium enterprises
MVA	Manufacturing Value Added
NDP	(Zambia) National Development Plan
NIP	National Industrial Policy (Zambia)
NORTEC	Northern Technical College
OECD	Organisation for Economic Co-operation and Development
PCP	Programme for Country Partnership
PPP	Purchase Power Parity
RCA	Revealed Comparative Advantage

SADC	Southern African Development Community
SDG	Sustainable Development Goal
SHP	Small Hydropower
SITC	Standard International Trade Classification
SME	Small and medium-sized enterprises
TVET	Technical and Vocational Education and Training
UNIDO	United Nations Industrial Development Organization
UNCOMTRADE	United Nations COMTRADE database
UNECA	United Nations Commission for Africa
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
UNZA	University of Zambia
VPoA	Vienna Programme of Action
WB	The World Bank Group
ZAMITA	Zambian Industrial Training Academy
ZEMA	Zambia Environmental Management Agency

Executive Summary

Zambia's ambition is to transition from being a lower middle-income (LMI) country to an industrialized middle-income nation by 2030. UNIDO and the Government of Zambia are collaborating to design a PCP program in which projects aiming at boosting inclusive and sustainable industrial development in the country will be identified and designed. The diagnostics study is a preliminary document focused on narrowing down the possible field of action and on embedding the PCP operation in the current policy framework of the country.

Performance

The country has experienced industrial growth over the period 2010 - 2018 but the contribution of the manufacturing sector to GDP still appears limited. The ambition of the country is now to climb the ladder of development, and to reach this objective the country is following the key strategic directions provided by the Vision 2030, the 7th National Development Plan and the National Industrial Policy (2018). These documents all point out the need for diversification and value addition. The analysis undertaken, which compares Zambia's performance with national objectives and performance of peer LMI countries, shows that the PCP comes in a timely manner to help fill the gaps related to the stated industrialization objectives. Zambia shows an important increase in the share of manufacturing employment, but this is not reflected in a symmetric increase of manufacturing sector's contribution to GDP. Value addition, particularly in manufacturing, is identified as an important focus area for the PCP which can be further disaggregated into different components.

The findings of this study confirm that Zambia, being a heavily resource-based economy, would benefit from further development of value chains to effectively transform raw materials into processed goods. In addition, boosting investment promotion will fortify growth in the manufacturing and related sectors, which is particularly salient with the declining share of FDI in GDP between 2010 and 2018. The energy sector can benefit from further support to diversify energy sources, to guarantee a more consistent energy supply required for an effective industrialization process and to encourage an efficient consumption of energy. This is particularly important in a time of heightened impact of climate change, where water scarcity has become an increasingly large challenge for a country that is heavily reliant on hydropower. The emphasis on environmentally friendly production processes needs to be enhanced in order to encourage circular economy and improvements of material consumption efficiency in production.

Based on the analysis, four components have been identified as valuable intervention areas under the value addition focus area of the PCP: 1) Value chain development; 2) Investment promotion for economic diversification; 3) Sustainable production processes; and 4) Clean and affordable energy. A gradual process of structural transformation towards more sophisticated and technological intensive sectors will be necessary for long-term industrial competitiveness. This will be made possible, in part, by upgrading the current labour skills. As pointed out by the study, Zambia requires particularly the improvement of technical and innovation skills. Interventions aimed at developing skills for the most vulnerable segments of the population including youth and women, would be necessary for inclusive growth. For this reason, the second focus area of the PCP is skills development, which has two components: 1) Skills for entrepreneurship and employment, and 2) Industrial skills for innovation.

Policy context

The quality of the policy implementation (effectiveness of the interventions and quality of the coordination process) will be crucial to steer the industrialization process towards the desired direction.

The country diagnostics shows performance in different indicators describing the policy context. In general terms, the performance indicators are above or quite similar to the average of lower middle-income countries. The industrial statistics and policy monitoring stands as an area requiring attention for intervention. The ambition is to improve the quality of the industrial policy process through the production of appropriate evidence to ensure it drives the country's industrialization trajectory, especially in difficult periods such as the current one, with the COVID-19 pandemic affecting economic performance. The country diagnostics shows that Zambia is highly dependent on the mining sector, particularly copper exports, creating high vulnerability for the economy. The current reduction of the copper price could further decrease revenues of the country. Evidence-based industrial policymaking and statistics is the third focus area of the PCP and it aims to support and equip the country with the necessary capacities to develop and monitor effective policies and strategies for industrialization.

Alignment of the focus areas and components to Zambia's strategic policy directions

The PCP focus areas and more specifically the components emerging from the diagnostics are entirely aligned to the current policy framework. The focus areas are strongly interconnected to the strategic directions found in the industrial policy of Zambia and related documents. The focus area *Value Addition* is backed by the principle identified as *Value addition on primary commodities*. The emphasis on *Skills* (technology related and for social inclusion) is aligned to the strategic direction *Employment creation, innovation and inclusiveness*. The investment focus emerging from the preliminary discussion and indices follow the industrial policy emphasis on investments, i.e. strategic direction *Investment flows into priority sectors and infrastructure*. The need of an inclusive and sustainable industrial development and focus areas related to environment and energy is aligned with the industrial policy focus on *Environmentally sustainable industrial production*, whereas the PCP focus area on *Evidence-based industrial policymaking and statistics* goes hand-in-hand with the identified strategic direction summarized as *Realistic, implementable and responsive policies and implementation plans*.

Narrowing down the field of action: The priority sectors

For a PCP strategy to be effective, it needs to be pragmatic and focus on several priority sectors, as the funds mobilization strategy cannot cover all the possible sectors of the economy or even all the manufacturing sectors. Apart from mining which is a straightforward priority sector using the key copper resources, the country diagnostics study examines the priority sectors identified in the country's industrial policy: Processed foods, textile and garments, leather and leather products, wood and wood products, metallic and non-metallic minerals, pharmaceuticals and engineering products. Based on the analysis of available data on value added, trade and employment the country diagnostics adopts different criteria to analyze the attractiveness of these sectors. The study shows that the sectors contained in the industrial policy can represent a reasonable starting point of dialogue for further project design on the basis of one or more economic and social criteria. Further analyses – although somewhat constrained by lack of data - help to focus the attention on sectors at more disaggregated level that, based on different criteria, could be interesting for PCP intervention.

Suggestions to facilitate the dialogue for the design of PCP projects: Key bottlenecks to address

The next phase of the PCP process will involve a dialogue between UNIDO project managers and the Government of Zambia to identify useful projects in the agreed focus areas and components, as well as priority sectors. The diagnostics study shows that bottlenecks are hampering a full development of key PCP focus areas in manufacturing sectors. On the basis of micro data and consultations, major obstacles by manufacturing firms are (i) the lack of stable power supply, which creates losses in production and

sales (ii) the lack of access to finance mainly due to insufficient collateral and high costs (iii) the competition practices of the informal sector (for formal firms) and (iv) the lack of, or complications with, access to land. These deserve special attention by project managers in designing PCP projects among the many other existing important bottlenecks of the country. Domestic firms, small and medium enterprises and non exporting firms are particularly vulnerable to these bottlenecks. The development of skills could help to promote social inclusion, to diversify the economy and to climb the ladder of innovation and development. Among a broad array of skills needed by the country, Information and Technology (IT) and vocational and technological skills deserve a special attention during the project design.

PCP Governance

The dialogue will be facilitated by the identification of focal points at UNIDO and the Government of Zambia per sector and identified component to design projects by taking into account main broad findings emerging from the study.

Introduction and Diagnostic Framework

This present diagnostic study aims to examine Zambia's aspirations, developments and challenges towards industrialization. The objective is to provide the PCP programming team and stakeholders comprehensive yet succinct information to successfully design and implement the PCP Zambia.

As the analysis is based on the country's industrialization objectives and priorities, the diagnostic framework was developed following the scrutiny of key development strategies and policies, including but not limited to the National Industrial Policy (2018), the 7th National Development Plan and the Vision 2030.

Block 1 analyses Zambia's industrial sector by assessing economic, social and environmental dimensions. These three aspects form the foundation of the industrialization objectives of the Zambian government, as highlighted in the 7th National Development Plan and the Zambia Industrial Policy of 2018. In particular, the vision of the Industrial Policy is "to be an industrialized and competitive nation with a diversified, innovative and globally competitive industrial base, which contributes to sustainable growth and employment creation by 2027." This is very much in line with the core of UNIDO's mandate, which is to support Member States to achieve "inclusive and sustainable industrial development".

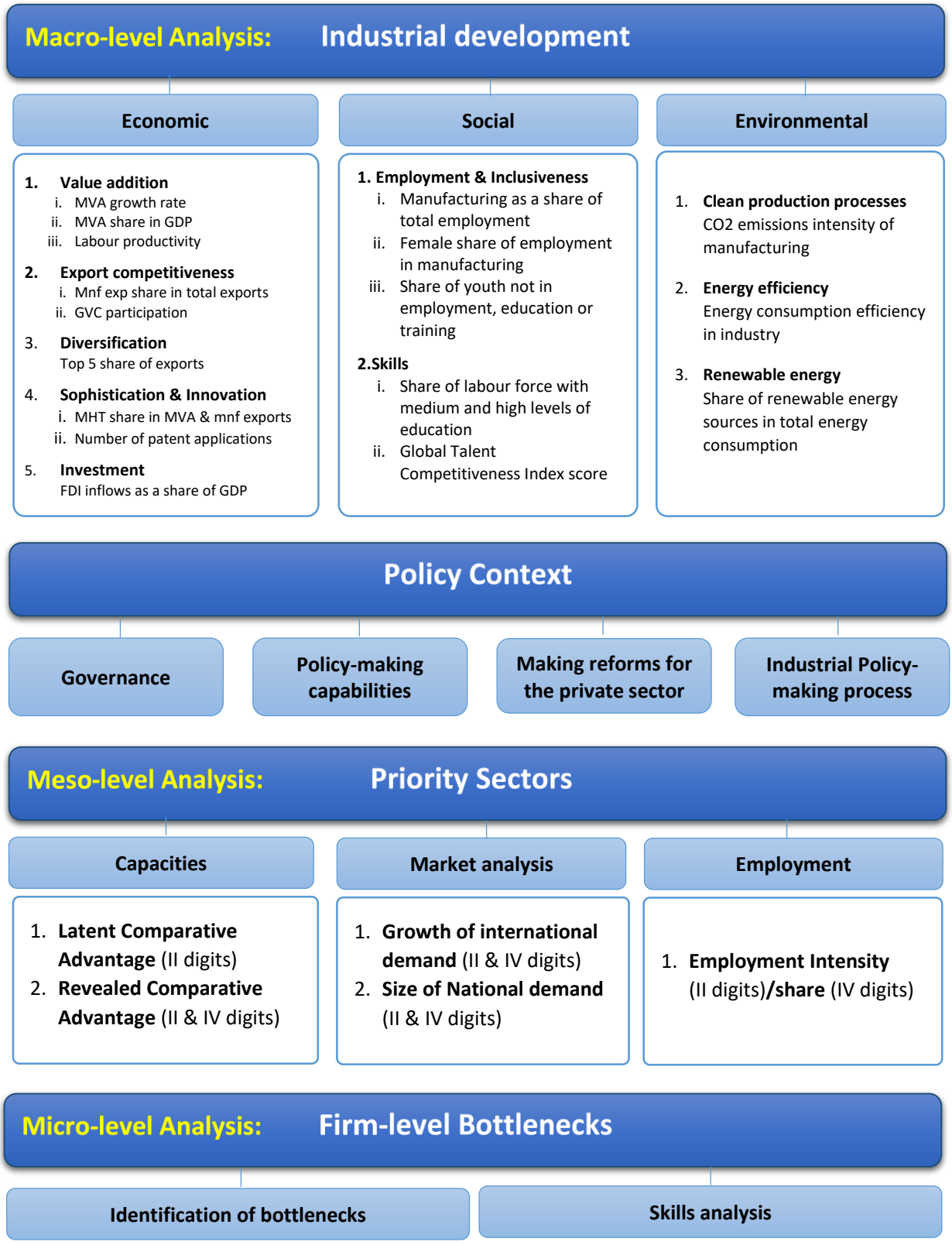
The economic dimension measures the core issues of value addition, diversification, export competitiveness, global value chain participation, innovation and investment. On the social dimension employment in manufacturing is observed, as well as female and youth employment. It also sheds light on Zambia's competitiveness in terms of skills available for industrial growth. The environmental dimension looks at energy efficiency, renewable energy and CO2 emissions by the manufacturing sector. Lastly, an analysis of the policy context is undertaken for the country.

Block 2 examines developments of Zambia's manufacturing priority sectors, as listed in the National Industrial Policy (2018). The analysis is based on an assessment of production and export capabilities, national and international demand, and employment intensity of sectors. The section also highlights interesting observations regarding subsectors which have been identified following a more detailed examination of the priority sectors at IV-digit ISIC level.

Block 3 reveals crucial information about key bottlenecks to manufacturing firms' operations through the analysis of micro-data from the World Bank Enterprise Surveys (2019 and 2013) and the World Bank Innovation Surveys (2013) for Zambia and comparator countries. It also shares key insights regarding skills requirements and constraints using the World Bank Skills Survey of 2016. The analysis is also disaggregated by categories such as priority sectors, size of firms, exporter status and whether they are domestic or foreign owned.

The final block (Block 4) presents the PCP framework based on the findings of the present report and broadly outlines a suggested PCP governance structure.

Figure 1 Diagnostic Framework for Zambia PCP



BLOCK 1: INDUSTRIAL PERFORMANCE AND POLICY CONTEXT OF ZAMBIA

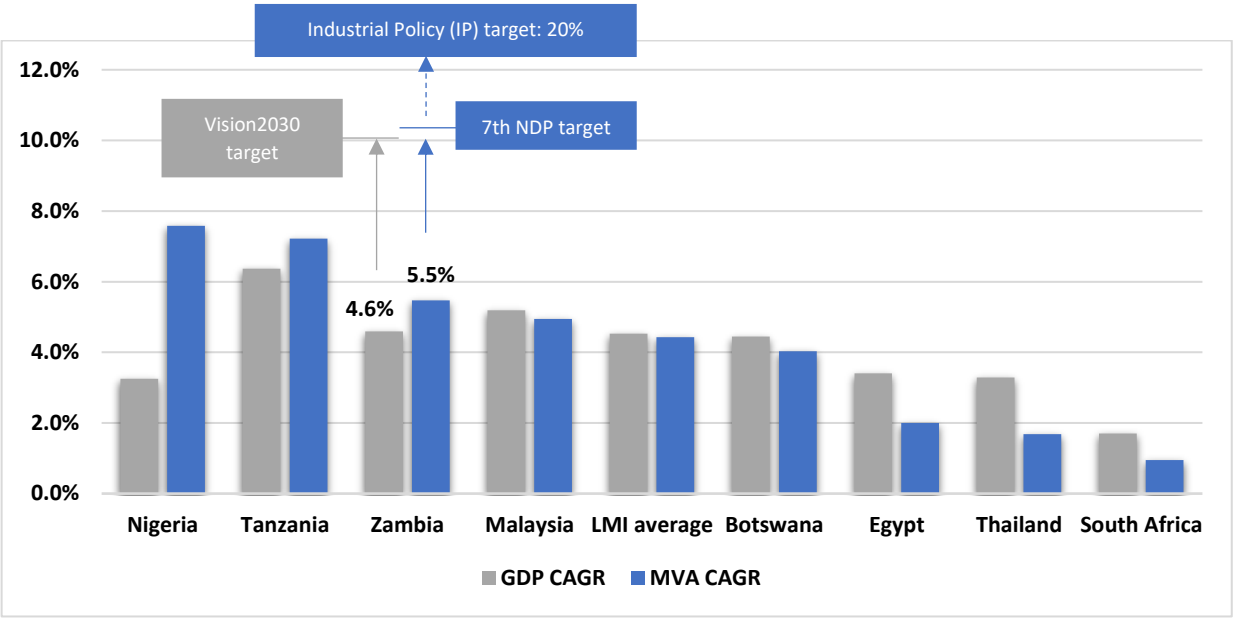
I. Economic Performance

a) Value Addition

Zambia's average GDP and MVA growth rates between 2010 and 2018 were 4.6% and 5.5% respectively (Figure 2). While GDP growth was on par with that of LMI countries' average, its manufacturing sector production grew significantly faster. Nonetheless, they both fall short of their targets as spelt out in country's development plans. The Vision 2030 aimed at having economic growth rates of between 6% and 10% on average, while the 7th National Development Plan had a target growth rate of 10.6% for MVA to be met by 2021 and the industrial policy aimed at an MVA growth rate of 20% on average by 2027. While economic growth since 2010 has led to a reduction of poverty (the share of population living with less than 1.9 USD PPP per day declined from 64.4% to 57.5% between 2010 and 2015), the poverty rate is higher than the 2002 level (49.4%) and exceeds by far LMI countries' average of 12.3%. Additionally, a rise in income inequality has been felt in the country, which is also reflected by the change in the Gini index (from 55.6 to 57.1 between 2010 and 2015).[1]

[1] Data source: World Development Indicators (The World Bank)

Figure 2 GDP and MVA growth rates (2010-2018)[2,3]



Data source: World Development Indicators (The World Bank)

Breaking down the period of analysis into two, it is found that the growth of both GDP and MVA decelerated from 5.7% and 7% between 2010 and 2014, to 3.5% and 3.7% between 2014 and 2018. Zambia relies heavily on the exports of copper (as will be seen in the export analysis) and the economic trends mirror very well the changes in global copper prices. Copper prices have been declining between 2018 and March 2020, creating unfavorable conditions for Zambia's economy. The vulnerability of the Kwacha, which is linked to the copper prices, affected all exports as well as imports of inputs and machinery required for production and undermined the country's efforts to diversify the economy. In addition to issues around copper dependency, climate change resulted in lower crop harvest in the recent years hurting agriculture and agro-processing and in electricity shortages (World Bank, 2018).

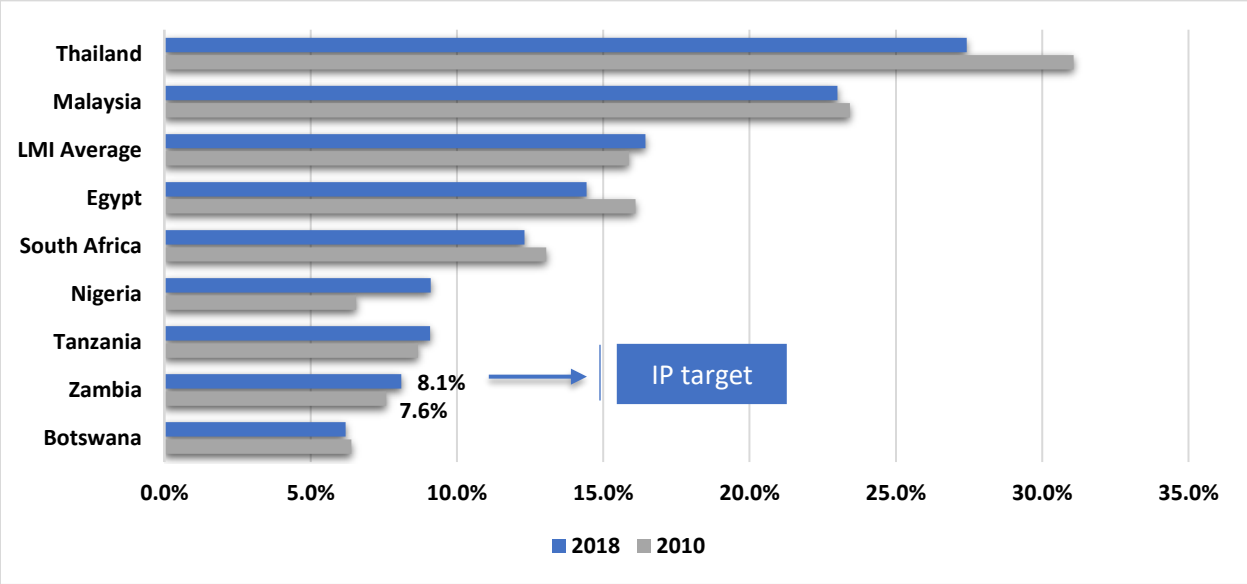
Aware of the copper dependency challenge, the government has put in place an array of interventions in order to support the economy through structural change and diversification, and by targeting their efforts to support the most vulnerable, following the blueprint of the national development plans and industrial policy. Nonetheless, the efforts have been limited by fiscal challenges (revenue is strongly dependent on copper) and large external debts (ZIPAR, 2020).

[2] Based on constant prices. Note: For figures and tables with no footnote on the use of constant prices it can be assumed that the prices are current and this will largely be due to the lack of data on constant prices.
Compound Annual Growth Rate (CAGR) is the mean annual growth rate over a specified period, taking into consideration the compounding from one year to another. It shows the growth rate under the assumption that it does not change over the entire time horizon.

[3] Normal practice in research is to calculate the growth rate of MVA and GDP using constant prices, as in Figure 2. However, if current prices were to be used, the gaps between actual growth rates and policy objectives do not change significantly. Using current prices, compound annual growth between 2010 and 2018 would be 5.0% for MVA and 3.5% for GDP.

The slowdown of growth since 2014 despite government interventions calls for renewed efforts to strengthen the economy by fostering industrialization in a sustained manner. Doing so will enable the country to achieve its vision of becoming a "prosperous middle-income nation […] that provides opportunities for improving the wellbeing of all" (Vision 2030, p. 6).

Figure 3 Manufacturing contribution to GDP (2010 & 2018)[4]

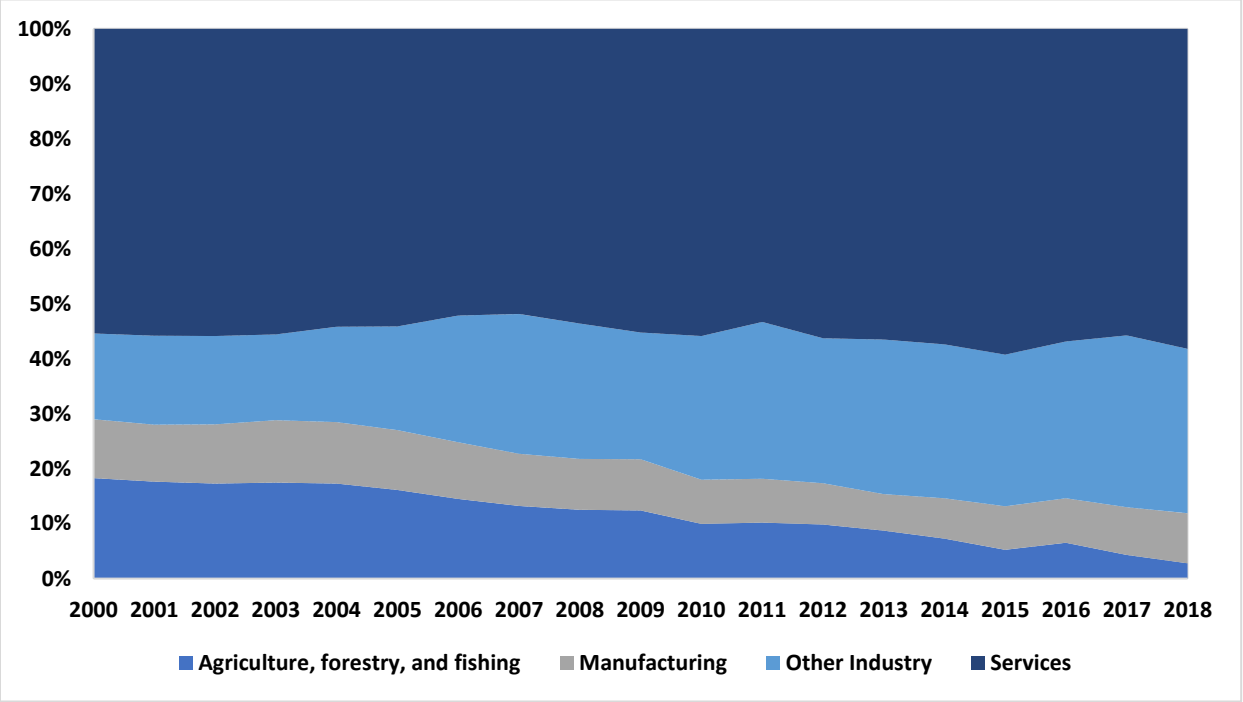


Data source: World Development Indicators (The World Bank)

As seen in Figure 3, Zambia's manufacturing sector accounted for 8.1% of GDP in 2018. This is half the LMI average of 16%. While there was a slight increase from the 7.6% in 2010, this was a result of minor waves of change, with no systematic increase in manufacturing contribution to the economy over the last decade. In fact, the share of manufacturing in GDP during the 1990's and early 2000's was 10 % on average, indicating that there has been a contraction over the longer period. This trend contrasts with that of Nigeria, for example, which has seen the role of manufacturing in the economy gradually increase since the turn of the century. As an effort to industrialize and having a strong sense of the importance that the manufacturing sector plays for economic growth (in part learning from the Asian comparator countries), the government has set a target of manufacturing accounting for 15% of GDP by 2027 in the industrial policy. Boosting the manufacturing sector will allow the country to benefit from the sector being the backbone of the economy, creating strong backward and forward linkages to other sectors and generating positive spillovers.

[4] Based on constant 2010 USD values.
Normal practice in research is to measure the share of a sector in GDP by using the constant values of the two variables. However, if current prices were to be used, the values would not change significantly and the large gap between Zambia and the average of LMI countries would persist. Using current prices, the share would be 8.4% for Zambia and 15.2% for the LMI average in 2018.

Figure 4 Structure of Zambia's GDP: Value added per sector as % of GDP (2000-2018)



Data source: World Development Indicators (The World Bank)

Most developing economies aspire to undergo structural change away from agriculture into sectors with generally higher levels of productivity. Figure 4 shows the contribution of each sector to Zambia's GDP between 2000 and 2018. In the case of Zambia, there was an evident decline in the contribution of agriculture to GDP from 16% in 2000 to 2.6% in 2018. This decline was mostly absorbed by the non-manufacturing industrial sector which includes mining (where the share to GDP almost doubled),[5] and to a lesser extent by the service sector (+5%).

Mining

The industrial sector excluding manufacturing – that is, mining and quarrying, construction and utilities – made up 28% of GDP in the last year reported, which is more than three times the extent of manufacturing. By far the largest contribution is copper mining, which has driven the Zambian economy since the 1920's and has made the country the world's single most copper-export dependent country in the world. Large foreign investments into the sector have resulted in concentrated economic activity and rapid urban migration creating the problematic rural-urban divide in the country which is still felt today. The increase in share of the sector in recent years was largely due to the expansion of large-scale mining (Lombe, 2018). However, while copper and cobalt account for roughly 70-80% of Zambia's exports, it only contributes to 8.3% of formal employment, therefore paving a non-inclusive growth path for the country.

The over-reliance on copper is a key economic concern of the country, making diversification away from copper a priority. The government recognizes that a contraction in the share of mining in GDP over time

[5] The industrial sector includes manufacturing, mining and quarrying, construction and utilities. The graph analyses manufacturing separately, so that "other industry" refers to mining and quarrying, construction and utilities.

would be favorable (assuming no reduction in output). The 7th National Development Plan acknowledges that diversification within the sector, such as into gold and minerals including gemstones, value addition of these and the development of mining value chains would be viable means to achieve more stable and inclusive economic growth. The Plan also appreciates the importance of backward and forward linkages across sectors and firms, linking urban and rural enterprises as well as SMEs with large-scale exporting firms.

Agriculture

Although the agricultural sector only contributes to a small share of the economy's output, it employs 54% of all persons employed. The government views agriculture as a strategic sector to promote in order to diversify the economy while providing livelihood opportunities for a large portion of the population. As a consequence, the government has continuously put in place and reviewed measures and programs to support the sector. Zambia has increased its spending on agricultural development from under 2% of its total budget in 2000 to 10% in 2010, in line with its commitment to the Malabo declaration of 2015 (African Union, 2018).

The country offers very favorable conditions for agricultural production, with large areas of (untapped) fertile land, conducive weather and large water resources. Despite this, agricultural production has declined over the years. The sector has a dualistic structure, with relatively efficient medium-sized commercial farmers on the one hand and small-holder subsistence farmers making about 75% of agricultural population on the other hand. The commercial farmers experienced improvements in their incomes since the early 2000's while the small-holder farmers struggled to do so, as they were unable to increase their labor productivity despite government programs in place. Meanwhile, commercial farmers were unable to meet their export potentials due to an overvalued Kwacha and the high cost of doing business (World Bank, 2018). Furthermore, the erratic rainfalls and other climatic volatilities negatively affected yields in the sector.

The lack of success despite the government's commitment to develop the sector, led the government to review the agricultural policies and measures put in place. The Farmer Input Supply Programme (FISP) and the Food Reserve Agency in particular, have been reviewed and reformed since 2015, due to issues of having focused too heavily on food security and maize and failing to take measures to increase productivity and competitiveness in the medium to long run.

Zambia has the potential to embark on an agricultural-led and inclusive industrialization trajectory given its natural endowments and due to increased national and regional demands for such products (as a result of a growing middle-class). Doing so could have significant positive effects on the rural poor. However, higher productivity in the sector and value addition of the agricultural products will be required to increase incomes and reduce the risks of undesired shocks, such as price and climatic changes. This will require investing heavily in agricultural infrastructure and support services, connecting farmers to domestic or regional value chains, investing in research and development (R&D), adopting appropriate technologies as well as creating a labor force with competitive skills in the sector.

Service sector

The service sector accounts for just over half of GDP and has had a very mild increase in its share since the start of the 2000's. The main economic activities within the sector are wholesale and retail, tourism, real estate and information/communication. The strong service sector is vital for industrialization, as

adequate service provisions and infrastructure are crucial for competitiveness. It is important to prioritize specifically those types of services required for industrialization (manufacturing-related services). In the case of Zambia, road infrastructure and ICT are two main areas that require further development, particularly due to the fact that it is a landlocked country. This is also in line with the Vienna Programme of Action (VPoA). In regard to ICT development, Zambia is hoping to become the next ICT hub of the region (7th NDP, 2007), although it still experiences limitations with broadband infrastructure. Improving on relevant services will not only support the large manufacturing firms and create jobs in the service sector but it will also ensure rural populations are better connected and will be able to participate more substantially in the economy.

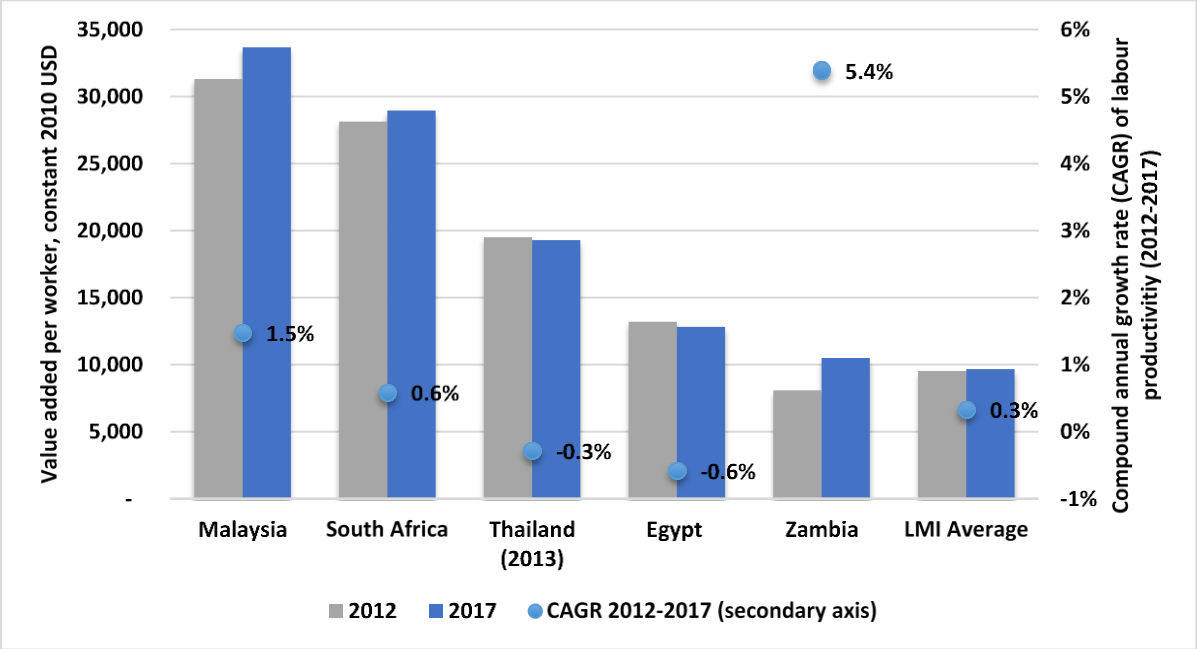
Furthermore, tourism accounts for an important part of the Zambian economy. Production of goods required for the tourism sector is a strategy used by numerous developing countries to further diversify manufacturing without the challenges of exporting. The sector creates a market for ornaments and souvenirs, utility materials, uniforms, toiletries and food and beverages in particular. For this reason, the sector is mentioned in the industrial policy as one of the key supportive sectors to industrialization.

Labor productivity in manufacturing

Labor productivity in manufacturing, that is the value added produced per worker, stood at roughly 10,500 constant USD in 2017, which is significantly below that of Egypt, Thailand, South Africa and Malaysia (Figure 5). Nonetheless, there has been a 5.4% annual growth since 2012, which allowed Zambia to surpass the average of LMI countries, which remained rather constant throughout the years at roughly 9,600 USD. Zambia's labor productivity in manufacturing is higher than that in agriculture (624 USD) and the service sector (6,830 USD) although somewhat lower than the industrial sector in total (i.e. including mining, construction and utilities), which was 12,890 USD in 2017.[6] Labor productivity in both agriculture and services has declined since 2012 illustrating their lack of competitiveness. While this trend may negatively impact the manufacturing sector as well, it further accentuates the need to boost processing of raw materials and ensure the manufacturing sector creates strong forward and backward linkages to the other economic sectors.

[6] Data source: World Development Indicators (The World Bank)

Figure 5 Labor productivity in manufacturing: Value added per worker (2012 & 2017)[7]



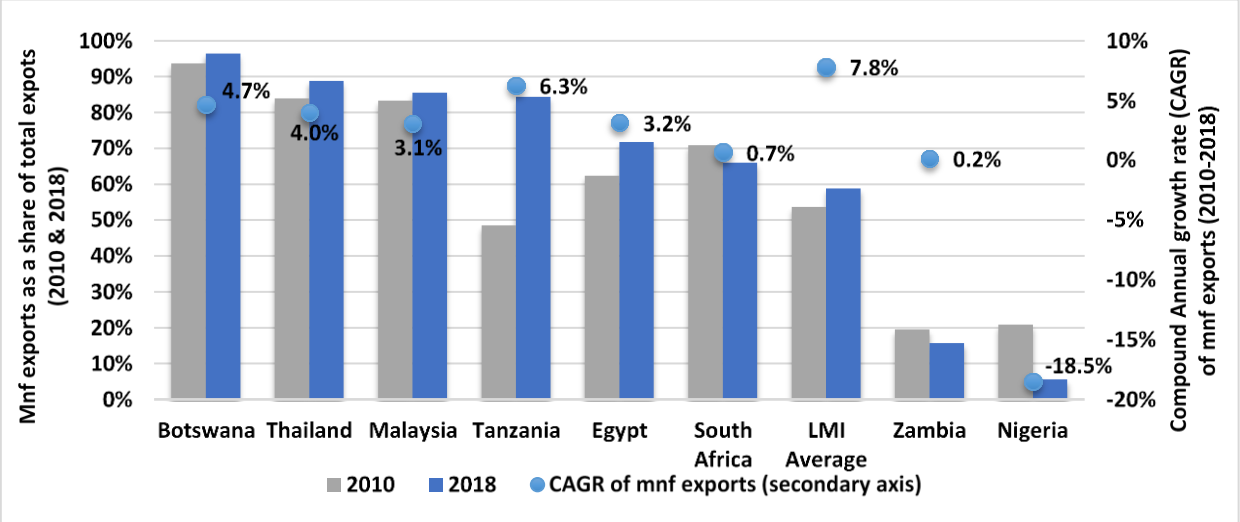
Data source: SDG9 database (UNIDO), ILOSTAT database (ILO), MVA database (UNIDO)

b) Export competitiveness

Zambia embarked on an export-oriented industrialization strategy at the beginning of the 2000's, making use of the fact that it shares a border with eight countries. Total exports have been increasing significantly since the early 2000s, on average at around 16 % per annum, despite a sharp drop between 2013 and 2016. However, the country started experiencing a trade deficit again since 2014 mainly due to the reduction in commodity prices, indicating a loss in competitiveness.

[7] Based on constant 2010 USD values.

Figure 6 Manufactured exports contribution to total exports (2010 & 2018)[8]



Data source: United Nations Comtrade Database (UNSD)

Overall, the share of manufactured goods in Zambia's total (merchandise) exports is very low compared to the average of lower middle-income countries and to the comparator countries presented in the graph (Figure 6). In 2018 a mere 16% of exports stem from the manufacturing sector, in contrast to 59% for the average LMI country group and above 80% in Tanzania, Malaysia, Thailand and Botswana. The manufactured export values of Zambia in 2010 and 2018 were almost equal to one another, although the country experienced a sharp increase until 2013 followed by a drop back to 2008-2010 values in 2015, after which there was little change. The lack of growth of manufactured exports in a period where total exports did increase resulted in the share of manufactured exports in total exports to decline. This indicates a loss of competitiveness of the country's manufactured goods in global trade.

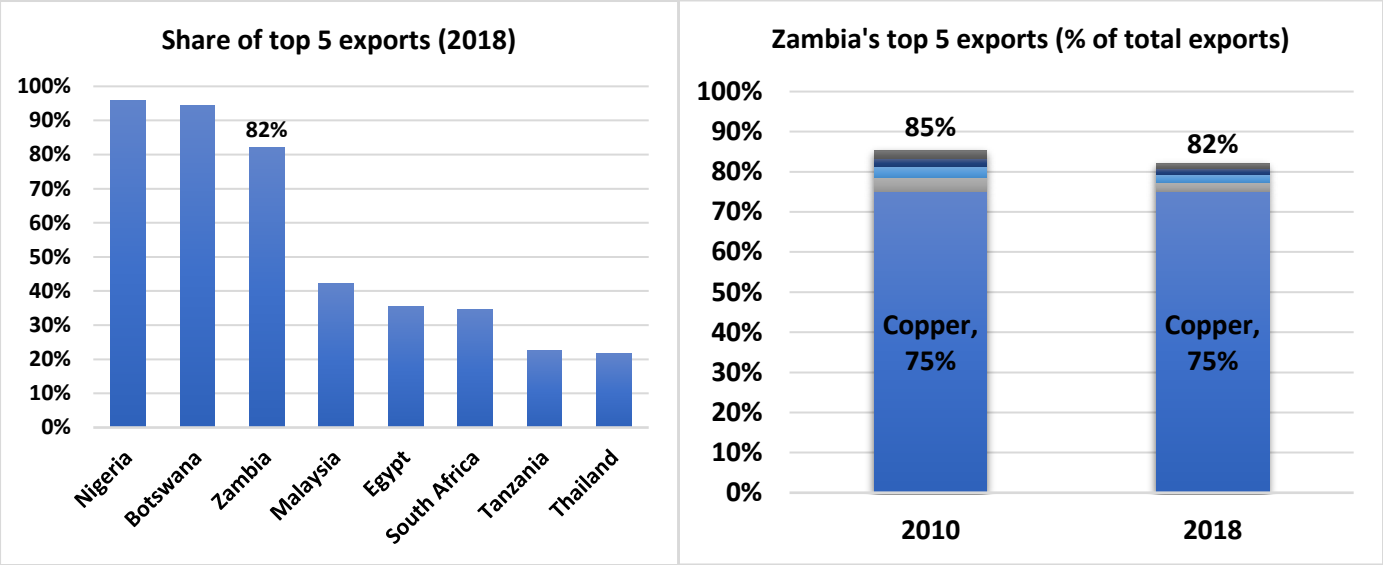
The country's objective of diversifying away from copper into the export of value-added products is highlighted in all current related development plans. The Vision 2030, for example, states that it aims to "Increase manufactures exports as a share of merchandise exports to 71 percent by 2030." The vision of Zambia's Trade Policy is to "Make Zambia a net exporter of value added goods and services through competitiveness at the domestic, regional and global level." To do so, it stated to be focusing on addressing macroeconomic conditions, infrastructure, technology and research and development, as well as skills and meeting sanitary and phytosanitary requirements, improving border efficiency, as well as making exported products more competitive, such as by reducing production costs and increasing the quality of goods. It also hopes to stimulate investments into export-oriented industrial sectors. In line with this, the National Export Strategy (NEST) 2018 has a vision of "A structurally transformed, diversified and competitive export sector anchoring Zambia's socio-economic development." (NEST, 2018, p. 2) and has corresponding objectives. The implementation of the policy and strategy is necessary to ensure export earnings are also derived from non-copper trade.

[8] Note: The group of manufactured products is based on UNIDO's Technology Classification of SITC Rev. 3. This is undertaken at 3-digit level, where there is no distinction between refined and unrefined copper. Hence, in the classification copper is categorized as a primary product and is therefore not considered as a manufactured export. Data at 5-digit SITC level reveals that refined copper contributed to 23% of total exports in 2018.

Diversification

Export product diversification analysis can be undertaken for total exports or for manufactured exports only. As the country is looking to diversify away from copper and increase the share of processed goods in total exports, it will be more interesting to observe total exports.

Figure 7 Share of top 5 products in total export basket of Zambia and comparators (2010 & 2018)

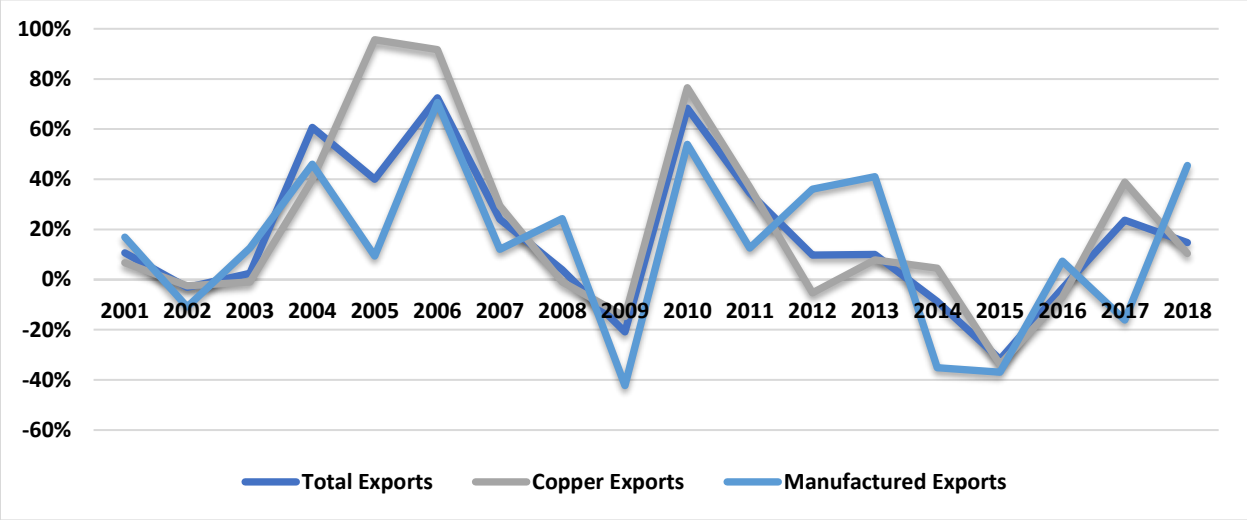


Data source: United Nations Comtrade Database (UNSD)

Zambia relies heavily on a very small number of export products, with the top five products contributing to 82% of total exports in 2018 (Figure 7). It is only surpassed by Nigeria and Botswana. Copper (both refined and unrefined) makes up for 75% of total exports and copper ores for another 3%. Although the picture remains rather constant between 2010 and 2018 with an unchanged level of importance of copper in total exports, a shift is observed in the level of processing of the exported copper: While until 2015 practically all copper exports were refined, there has been an increase in the exports of unrefined copper since then. By 2018, 68% of the copper exports were unrefined.

Figure 8 illustrates the strong influence that copper exports have on the overall economy, which can be identified by the remarkably similar trends in yearly growth rates of copper exports, total exports and manufactured exports. The price of copper does not only influence the export values of copper, but also the export competitiveness of other goods and causes strong fluctuations in government revenue. This emphasizes the need for diversification, where strengthening national supply chains to copper production may be one strategy, while increasing competitiveness of other sectors will also be necessary for poverty reduction and balanced growth as discussed earlier.

Figure 8 Growth rates of Zambian copper, manufactured goods and total exports (2001-2018)



Data source: United Nations Comtrade Database (UNSD)

Manufactured exports are only somewhat more diversified. The top five most exported manufactured goods by Zambia (Elementes/oxides/hal salt, base metal mnf., other mineral manufactures, lime/cement and sugar/mollasses) jointly account for 49% of all manufactured exports.[9]

Box 1: COVID-19 and the vulnerability of Zambian Exports

The over-reliance on copper exports is particularly worrying in times of external shocks, as also pointed out by Ndulo, et al. (2009). The current COVID-19 pandemic which is causing economic uncertainty across the globe, has already proven to affect the Zambian mining and economy, with the Glencore copper mine stating to shut down its production for three months, to show one example.[10] The country is also concerned about the effect of the pandemic on its agricultural value chains.[11] The debt of the country (estimated at 78 % of GDP), the weak social protection programs and the high share of people working in the informal sector put additional constraints on the country's coping strategies (Siwale, 2020).

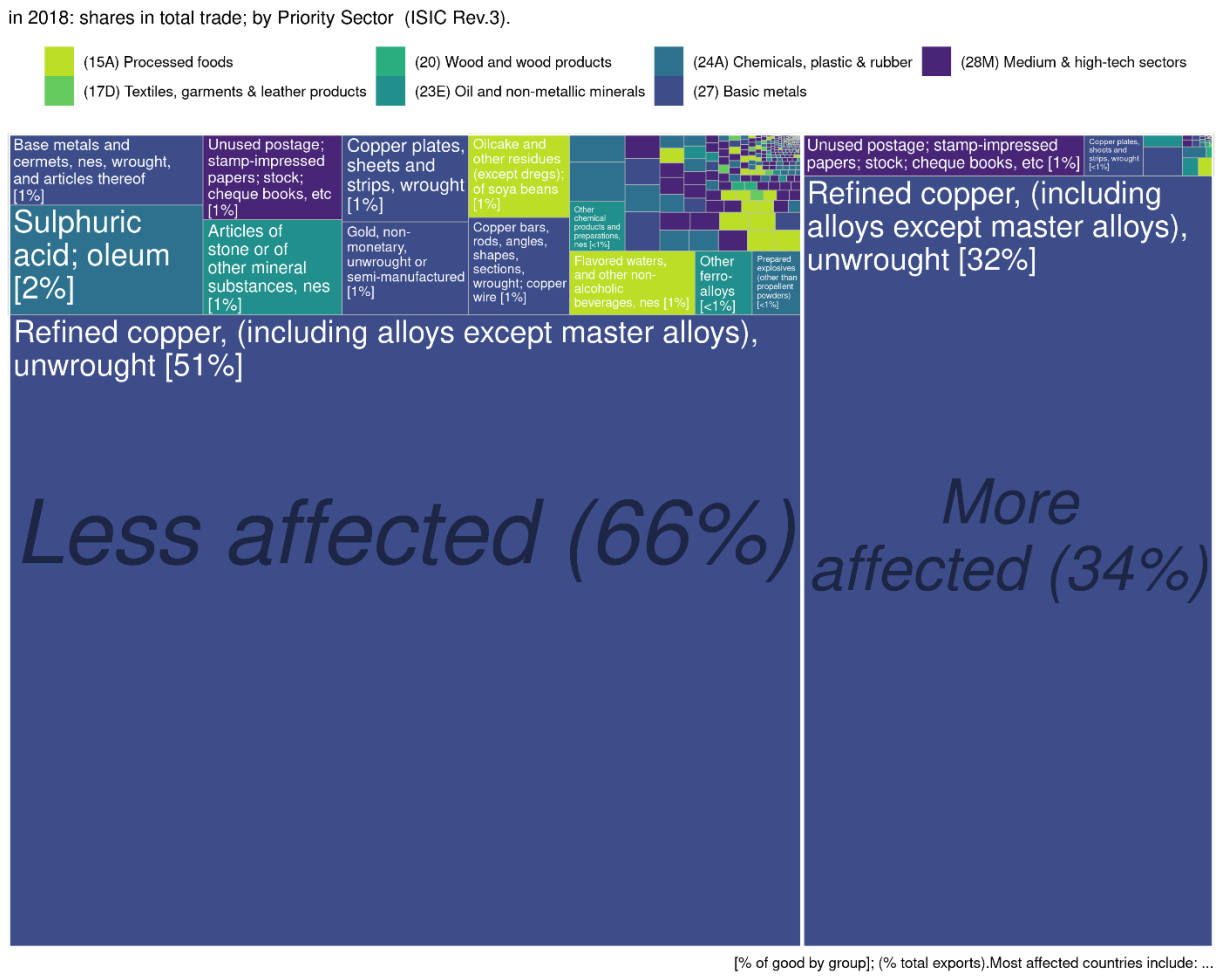
This warrants further analysis on how the pandemic may be impacting Zambian manufactured exports. For this, trade with countries that have experienced an early outbreak (recorded the highest shares in deaths and recorded cases in mid-May of 2020) of COVID-19 are analyzed. This is because even though COVID-19 has developed into a global pandemic affecting most if not all countries, the selected list represents countries that have experienced the exposure to COVID-19 for the longest time period and it is therefore assumed that COVID-19 related effects have manifested themselves in most dimensions (including socio-economic, political, societal) for this group of countries already. These countries are labelled as 'more affected' in this analysis, however, this does not imply that COVID-19 does not/will not affect countries that are currently not classified to this group.[12] Figure 9 illustrates

[9] Data source: United Nations Comtrade Database (UNSD)
[10] Source: https://www.ft.com/content/25f312b1-ef16-4b07-99fe-f1456be023b5 . Accessed 9 April 2020
[11] Source: https://www.lusakatimes.com/2020/04/07/279465/. Accessed 15 April 2020
[12] To this end the list of countries includes Belgium, China, France, Germany, Iran, Italy, Netherlands, South Korea, Spain, Switzerland, Turkey, UK, US. Please note that while it is guaranteed that this list may vary notably over time and may fail to reflect the full dimension of the effect of COVID-19 on Zambia; however, it is the best approximation based on information that was available at the time of writing this report. What is more, the list already includes the

that roughly a third of Zambia's manufactured exports are sent to the top 10 identified countries. Refined copper makes up a disproportionally larger share of exports to more affected areas, which confirms the above.

On the import side, Zambia tends to source less from the most affected countries. In 2018 9% of imports came from the group of top 10 most affected countries. However, Zambia's mining sector may be more affected than other sectors, as half of the imports for commodity *Machinery for crushing, grinding, etc.,* which is required by the sector, was imported from the top ten affected countries – thus putting even more pressure on the performance of the sector.

Figure 9 Zambia's export structure by country-groups more/less affected by COVID-19 (2018)



Data source: United Nations Comtrade Database (UNSD)

An analysis of Zambia's exports during the 2008 financial and economic crisis reveals that exports decreased by 18% between 2007 and 2009 (when exports were at their lowest point), though only to rapidly reach higher than pre-crisis levels by 2010. The largest decline over the short period was due to contractions in exports to Switzerland which, however, skyrocketed after 2010. Exports to China, which was the second largest market for Zambia, did not decline during the crisis (further details are provided in Figure 26, Appendix A). That being said,

two countries (Switzerland and China) with which Zambia has had strong export connections. Therefore, this injection can serve as an indication on what the effect of COVID-19 may be on the Zambian economy.

the IMF has warned that the impact of the virus may be far from negligible, particularly due to a significant slowdown in the economic growth of China (IMF, 2020).

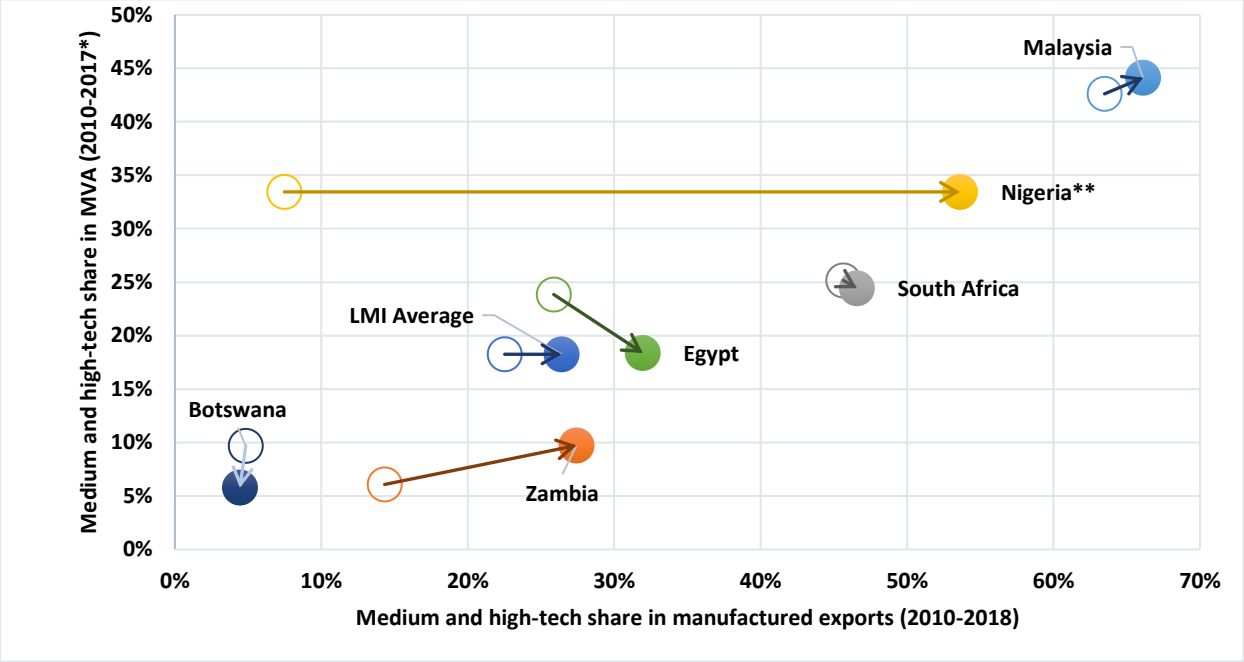
c) Sophistication and innovation

Zambia is still largely focusing on developing light manufacturing sectors such as food processing and textiles which are of paramount importance for job creation and inclusive growth. Nonetheless, its long-term competitiveness will also depend on the extent to which it can develop more sophisticated sectors and be competitive in exporting them. This has also been recognized in the policy documents, where engineering products and pharmaceuticals are listed as two of the priority sectors. A large body of literature also suggests that investing in research and development (R&D) and innovation will increase the competitiveness of manufactured exports, which is also highlighted in UNIDO's research (UNIDO, 2002).

In order to understand the technological sophistication of Zambia's manufacturing sector, the UNIDO technological classification for the International Standard Industrial Classification of All Economic Activities (ISIC) and the Standard International Trade Classification (SITC) are used to distinguish between resource-based and low-tech manufactured exports and medium and high-tech manufactured goods. Figure 10 below presents the share of medium and high-tech products in Zambia's production and exports. 27% of Zambia's manufactured exports were considered to be medium and high-tech in 2018. This is a very similar level to LMI average. In terms of production, however, 9% of MVA derived from such technology-intensive products, which is half the share LMI countries had on average. It indicates that some of the exports of this type were likely to be re-exports or that little Zambian value addition went into the exports of these products.

The upward trend over the years shows promising signs of improvement in technology intensity of production and exports, hinting towards increased capabilities and competitiveness in the sector. The position that the other countries in the graph hold - apart from Botswana – indicate their higher level of competitiveness. Malaysia can be seen as a role model, not only for having had the highest shares of medium and high-tech but also for having continued to enlarge these over the years.

Figure 10 Share of medium and high-tech products in production and exports (2010 & 2017/18)



*Data on medium and high-tech share in MVA is only available until 2017.
** Nigeria has not been reporting data which would allow to update the indicator on share of medium and high-tech in MVA, hence the share appears to remain constant in the graph.
Data source: United Nations Comtrade Database (UNSD), CIP 2019 database (UNIDO)

While global data shows that more R&D generally takes place in medium and high-tech sectors, R&D can improve competitiveness for the production of any given good. The importance the government has placed on research and development can be identified by the emphasis this received in the industrial policy, being addressed in the rationale of the document and as part of many of the strategies. Patent applications also result from R&D and innovation. Table 1 presents the number of patent applications made by residents in Zambia and its comparator countries. While the numbers in Zambia were still low, the country had 12 applications in 2017 compared to three applications six years earlier. In comparison, Botswana reported three in 2017, Nigeria 100, South Africa over 700 and Malaysia roughly 1,170.

Table 1 Patent applications by residents (2011 & 2017)

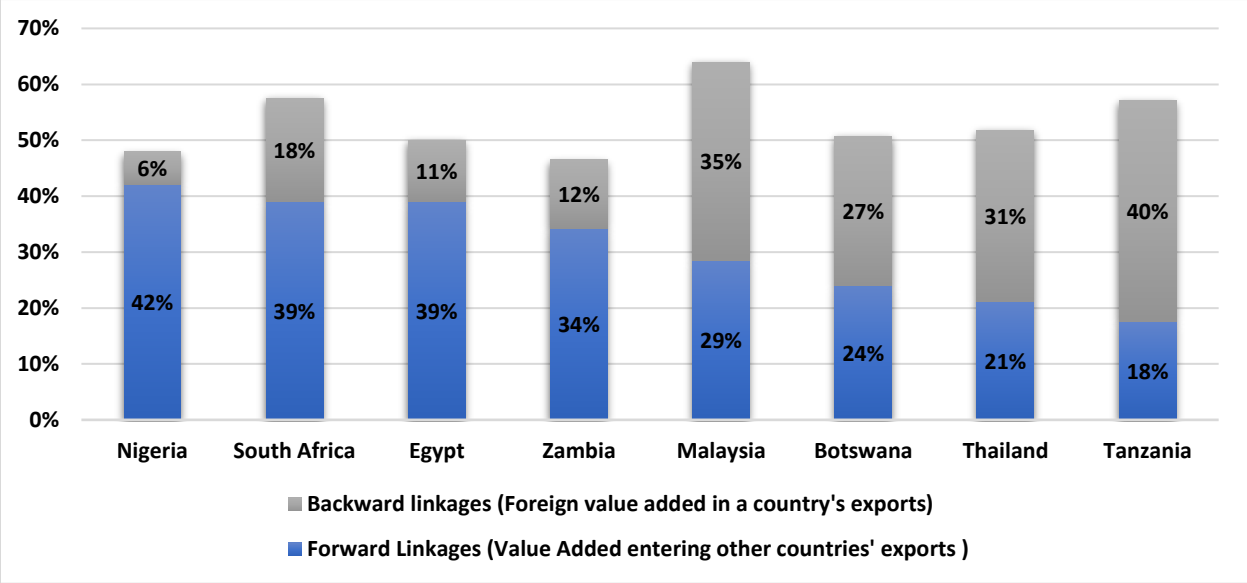
Patent applications, residents		
	2011	2017
Malaysia	1,076	1,166
Egypt, Arab Rep.	618	1,025
Thailand	927	979
South Africa	656	728
Nigeria	64	100
Zambia	3	12
Botswana	1	3

Data source: World Development Indicators (The World Bank, 2020)

d) Participation in global value chains

Global value chain (GVC) participation can be measured as the sum of forward linkages (that is, the domestic value added that flows into other countries' exports) and backward linkages (the foreign value added in the exports of the country of interest). The values are measured in relation to gross exports of the country. Zambia has strong forward linkages as can be seen in Figure 11. 34% of Zambia's exports were value added created in Zambia that flowed into the exports of other countries. This was more than in Malaysia and not far from the forward linkages that South Africa and Egypt have. However, the majority of this were derived from either non-manufacturing or low-tech manufacturing sectors, as was found in UNIDO (2015). This is in line with previous findings in this study, particularly considering 75% of exports were copper (both refined and unrefined).

Figure 11 Global value chain participation (2018)



Data Source: UNCTAD-Eora GVC Database

12% of Zambia's exports stemmed from value added created abroad (foreign value added). The low share of foreign value added combined with a higher share of domestic value added in other countries' exports further indicates that Zambia still operated in the upstream segment of global value chains, which is common among countries that rely on their extractive sectors or commodity exports (Banga, 2013) and is in line with the findings of other Sub-Saharan African countries (UNIDO, 2015). Overall, 46% of Zambia's exports were linked to value chain activity, which is marginally lower than the peer countries presented in Figure 11.

In order for Zambia's economy to fully benefit from participating in mining (or other) GVCs, it will need to engage in further value addition of goods before exporting where this makes economic sense. Furthermore, it has been observed that the sector has not been creating the desired socio-economic impact of poverty reduction and inclusive growth (UNCTAD, 2017). Creating a system in which SMEs act as key suppliers to the industry can be key in changing this situation. There are strict requirements for participating directly in GVCs as well as for supplying to exporting firms who engage in such activity, which create large challenges for domestic and small firms in particular. These include complying to quality

standards and ensuring consistency in quantity and quality, which require sound managerial competencies, sufficient market information and adequate infrastructure, to name a few (Kanyinji & Tembo, 2019a). Supporting SMEs in obtaining such capabilities and reaching such standards will allow them to participate more substantially to economic growth.

The country's National Local Content Strategy aims to increase the use of locally produced goods and services, encourage business linkages with MSMEs, increase local ownership of firms, ensure a certain extent of local employment at all levels and encourage the transfer of skills and technology from foreign investors to Zambians. However, recent survey information on SMEs found that while the strategy and related policies have helped improve skills and capacity, they have not been able to increase business relations with mines (Kanyinji & Tembo, 2019b).

e) Regional markets for exports

Regional markets can play an important role for countries to boost their exports due to lower logistics costs, the simpler and cheaper trade arrangements, somewhat softened competition and often similar (if not the same) product standards to the country of origin. The Government of Zambia has identified both SADC and COMESA as important trading partners and markets to expand to. Both markets are indeed increasingly important for the country, with COMESA receiving 15% of Zambia's exports in 2018, while SADC received 20% (Table 2). The regional markets become significantly more important when considering value-added products, with COMESA accounting for 64% of Zambia's manufactured exports and SADC with 75% in 2018. Such regional markets tend to be excellent entry points for a country to export processed goods at early stages of development. This is evidently true for Zambia as well, where the majority of its exports to regional economic communities was manufactured: While the share of manufactured goods in total exports for Zambia was 16% in general (as seen in Figure 6), the share was 62% when considering Zambia's exports to SADC only and 78% of its exports to COMESA only.

Table 2 Zambia's exports to COMESA and SADC (2010 & 2018)

Share of Zambian exports				
	Total exports		**Manufactured exports**	
	2010	**2018**	**2010**	**2018**
COMESA	10%	15%	33%	64%
SADC	18%	20%	53%	75%
Zambia's market share				
	Total exports		**Manufactured exports**	
	2010	**2018**	**2010**	**2018**
COMESA	0.48%	0.41%	0.19%	0.15%
SADC	0.45%	1.02%	0.17%	0.16%

Data source: United Nations Comtrade Database (UNSD)

Despite these regions being important markets for Zambia's manufactured goods, Zambia's market shares in both regional economic communities have in fact been slightly contracting. This has happened despite growth in demand for manufactured goods in the region of around 1% on average since 2010 (United

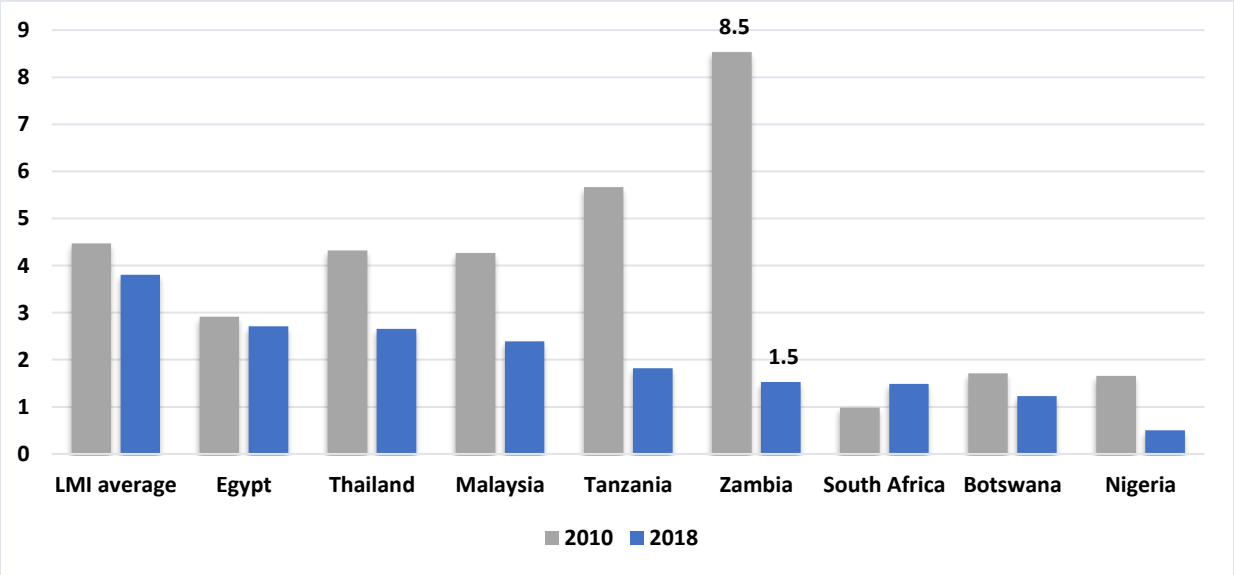
Nations Comtrade Database, UNSD). With a market share of 0.15-0.16% in either market, there is significant room for Zambia to exploit these market opportunities further.

The industrial policy highlights the importance of such regional economic communities and mentions the government's efforts to deepen regional integration for greater market access - in particular for manufactured goods. Similarly, the trade policy states as a specific objective "to increase export market share within regional economic communities and across the African continent." A further step in this direction is Zambia's signing of the African Continental Free Trade Area (AfCFTA) agreement in February 2019. This has the potential of significantly increasing market access and offering new opportunities for foreign investors (PMRC Zambia, 2018). In order for Zambia to benefit from this FTA, the country will need to strengthen its export competitiveness further. This is necessary so that it can face the competition from more advanced economies in the region such as South Africa, Cote d'Ivoire and Kenya, who held, respectively, 55%, 6% and 3% of Sub-Saharan African market share of manufactured goods in 2018, versus Zambia's 2%.

f) Investment

Expanding investment into the economy and the manufacturing sector in particular is a priority for the country. The industrial policy, for example, has a specific objective of increasing actualized domestic and foreign direct investment in priority sectors. Under this it plans to create an investment promotion program focusing on the priority sectors, promote the development of industrial parks and Multi-Facility Economic Zones, improve the monitoring of investments and promote investments in rural regions and in renewable energy.

Figure 12 FDI net inflows as a share of GDP (%), (2010 & 2018)



Data source: World Development Indicators (The World Bank)

Foreign direct investment net inflows have been strongly fluctuating in Zambia. The target stated in the 7th National Development Plan, where this is a Key Performance Indicator, was set to 3,554 million USD

which is far from the 408 million USD observed in 2018. Zambia's FDI net inflows as a share of GDP also showed large fluctuations which seem to be unique to Zambia, being 8.5% in 2010 and dropping to 1.5% in 2018 (Figure 12). Although a number of countries have also seen inward investments decline in recent years, the average share of FDI inflows for LMI countries was 3.8% of GDP which is more than twice the Zambian share.

Foreign investments into Zambia are concentrated in the mining and particularly copper industry and the global copper prices strongly affect the trends of inward investments into the country. The decline in FDI in 2017/2018 is due to a sharp drop in investment into mining as a result of a lack of new projects in the sector. This resulted in the manufacturing sector reporting the largest investment inflows of all sectors for Zambia in the same year (GoZ, 2018; UNCTAD, 2019).

In addition, more recently investments are obliged to undergo the Environmental Impact Assessment as stated in the Environmental Management Act No. 12 of 2011. However, as indicated in the industrial policy, high costs and long processing periods have been associated with the assessment, causing serious concern for investors and negatively impacting investments in the country.

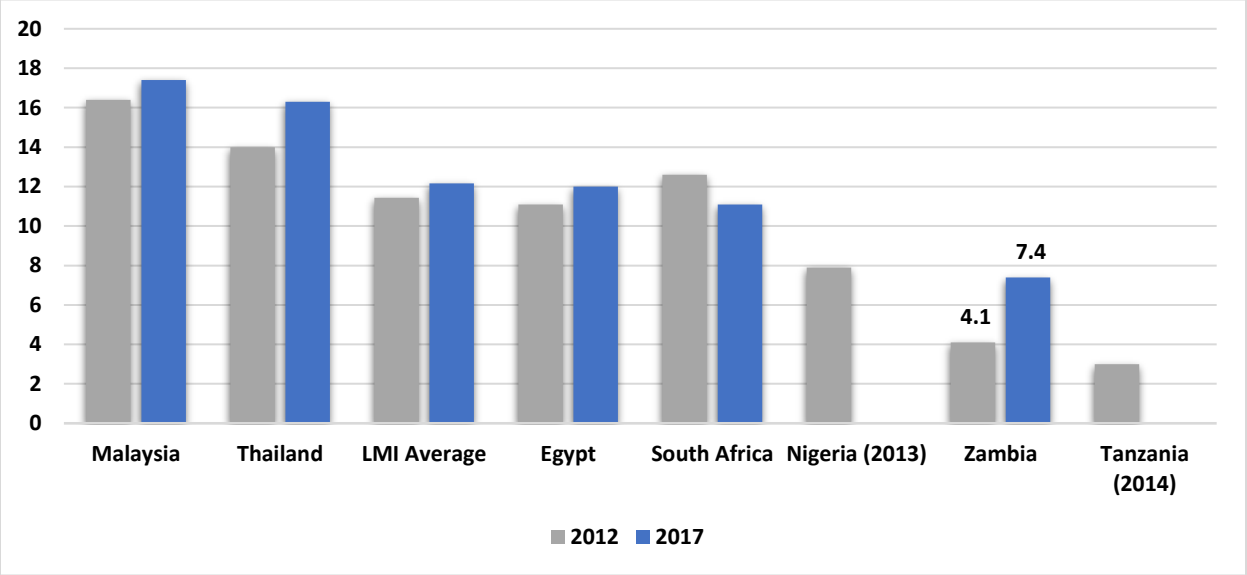
Main determining factors for FDI inflows include economic and political stability, a range of attractive investment opportunities, conducive legal and regulatory frameworks and adequate infrastructure. The government is aware of the challenges and has started implementing a range of activities to improve the investment climate of the country. The manufacturing sector has potential for investment growth due to the country's abundance of natural resources, political stability and a relatively skilled workforce, as well as further efforts to offer industrial skills training (for example ZAMITA). There is hence still significant untapped potential for increased investment in the sector.

II. Social Performance

a) Employment and inclusiveness

7.4% of people employed in Zambia worked in the manufacturing sector in 2017 (Figure 13). Although this is still far from the LMI average, the figure is more or less in line with the 8% contribution of MVA to GDP. A large increase has been observed since 2012, when the share was 4.1%. This indicates that there has been a movement of labor into manufacturing although the sector has not been able to increase its contribution to overall GDP.

Figure 13 Employment in manufacturing as a share of total employment (2012 & 2017)



Data source: SDG9 2019 database (UNIDO), ILOSTAT database (ILO)

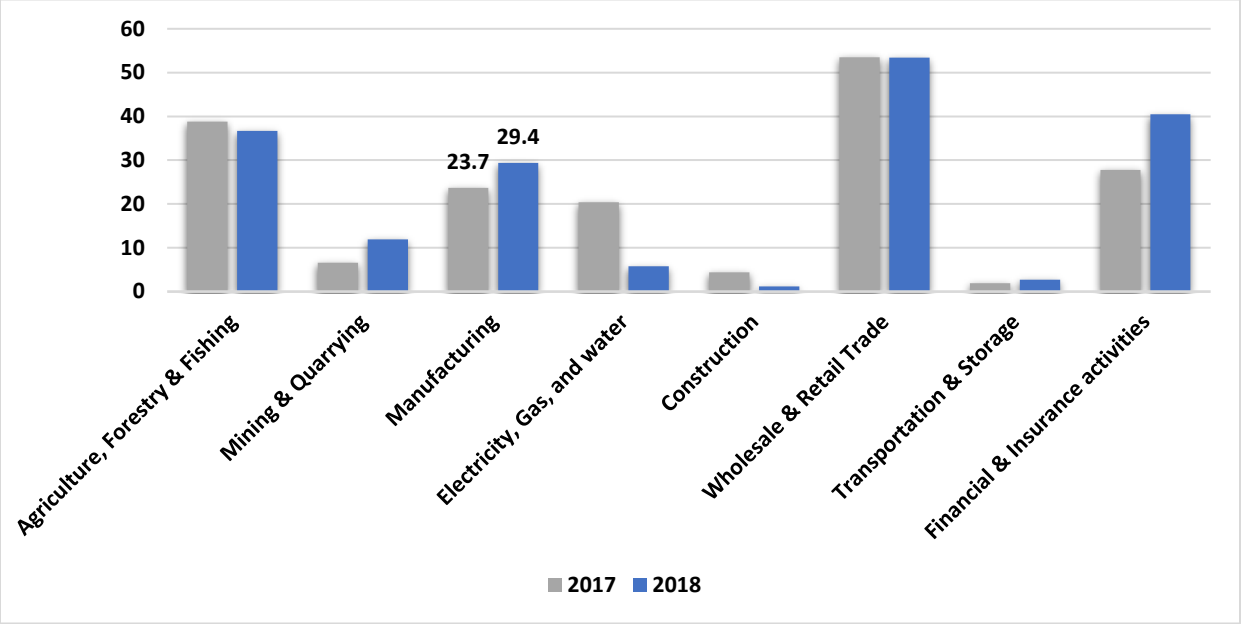
The high poverty rate and inequality that persist in the country call for renewed efforts to boost employment and create inclusive industrial and economic growth. A specific objective of the industrial policy is to increase employment in manufacturing by 100% until 2027. Between 2017 and 2018 the recorded growth was 0.4%. The weak ability to create employment in the sector will require further attention to create the desired inclusive growth. Furthermore, the vast majority of the working population is employed in the informal sector (89%), generally having lower and unstable incomes as well as poor working conditions (ILO, 2018).

In order to create employment opportunities in the manufacturing sector and in manufacturing-related activities, there is a particular focus on developing labor-intensive manufacturing sectors such as food processing, textiles and leather products. In addition to promoting such sectors by developing clusters and establishing industrial parks and Multi-Facility Economic Zones, the government has been supporting the development of sector specific skills, improving occupational health and safety and supporting to cooperatives.

Gender equality

The country places a strong importance on gender equality, as can be seen from the Vision 2030 (where it is the first mentioned topic related to socio-economic justice) and the industrial policy (where it is a key cross-cutting issue), in addition to other development plans and strategies. It also has the National Gender Policy 2014 and The Gender Equity and Equality Act 2015 in place. Female share of the labor force was 39% in 2018 (ILOSTAT), however women accounted for less than one third of people employed in manufacturing (Figure 14). The share is lower in typically male-dominated sectors such as mining, construction and transport and higher in agriculture, wholesale/retail and in the financial sector.

Figure 14 Female share of employment in manufacturing and other sectors, Zambia (2017 & 2018)



Data source: Zambia Labor Force Survey, Zambia Statistics Agency

Generally, the manufacturing sector reaches higher levels of productivity and – as a result – wages than in agriculture and retail. A larger manufacturing sector also tends to be associated with higher spending on R&D (Vezzani, 2017). For these reasons, among others, economies have recognized the need to create gender equality within the manufacturing sector in particular, as a means of reaching sustained gender parity in the country. This goes significantly beyond measuring the female share of employment in manufacturing, as in many economies women are hired for their low wages to become internationally competitive in export-oriented labor-intensive sectors, such as textiles. Therefore, tracking the roles and experiences women have in the sector is at least equally as important.

Findings from the World Bank Enterprise Survey 2019[13] for Zambia reveal that merely 13% of manufacturing top managers were female and this share did not change since 2013. In terms of business owners, however, a more equal picture is found: While in 2013 34 % of the manufacturing sector business owners were female, the share increased to 43 % in 2019[14] (further details are provided in Table 27, Appendix A). In 2013, the highest share of business owners that were female were found in the medium and high-tech sectors (excluding fabricated metals and chemical products) and textiles (44% and 42% respectively). On average in 2019, 23% of production workers were women in Zambia, although the share was 32% in the textiles sector (more than double any other manufacturing sector), where the survey also revealed that workers were not happy with the working conditions (see Table 24). Monitoring the working

[13] Please note that the 2019 Survey contains about 50% coverage of manufacturing firms compared to the 2013 Survey and the two survey do not include the same set of firms. Information emerging from the two survey could not be completely aligned for comparisons.

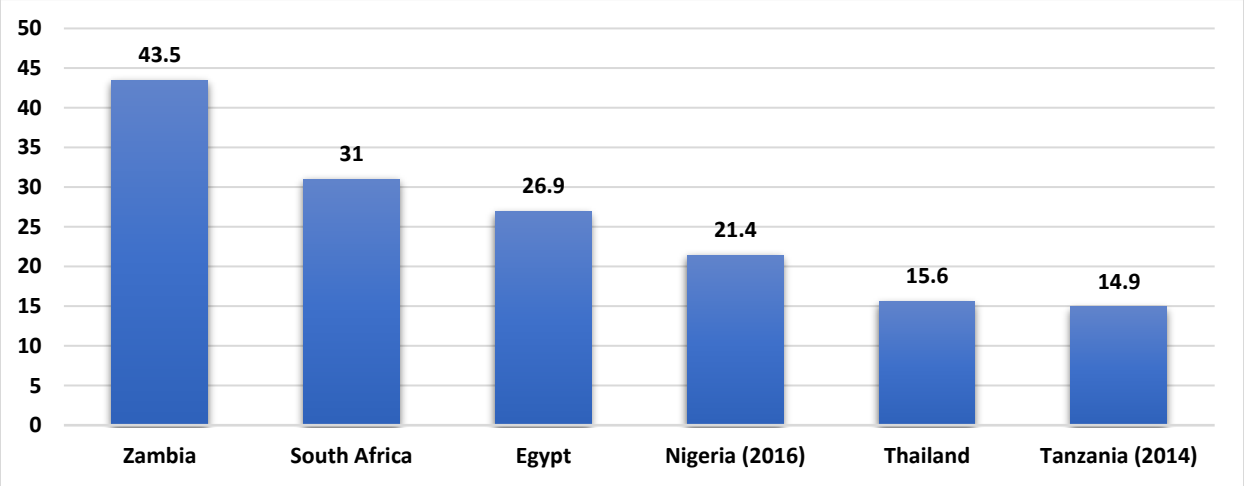
[14] The question in the survey refers to owners that at least own parts of the business. They do not necessarily own the business alone.

conditions of both formal and informal workers will be necessary to ensure that poor and harmful working conditions are not found in the manufacturing sector of Zambia.

Overall, the increase in female employment between 2017 and 2018 shows promising signs, although there is a need to observe trends over longer periods. Some of the determining factors as to why women may face challenges to enter manufacturing or have similar roles and experiences as men within the sector include extent of unpaid care work, lower education and relevant skills, lower participation in R&D, less financial and digital inclusion, less access to land and other assets as well as cultural norms and legal restrictions (UNIDO, 2019). The main factors limiting women in Zambia were reported to be access to land and credit (NIP, 2018). Understanding the extent to which gender inequalities can hamper economic growth, the government has developed policies that support gender equality in accessing, owning and managing resources and is promoting business development services for women entrepreneurs, including trainings and mentoring schemes. The signing of the United Nations Convention on The Elimination of All Forms of Discrimination against Women (CEDAW) showed that the country is ready to work towards ensuring equal access to finance among other things.

Youth employment

Figure 15 Share of youth not in employment, education or training (%), (2017)



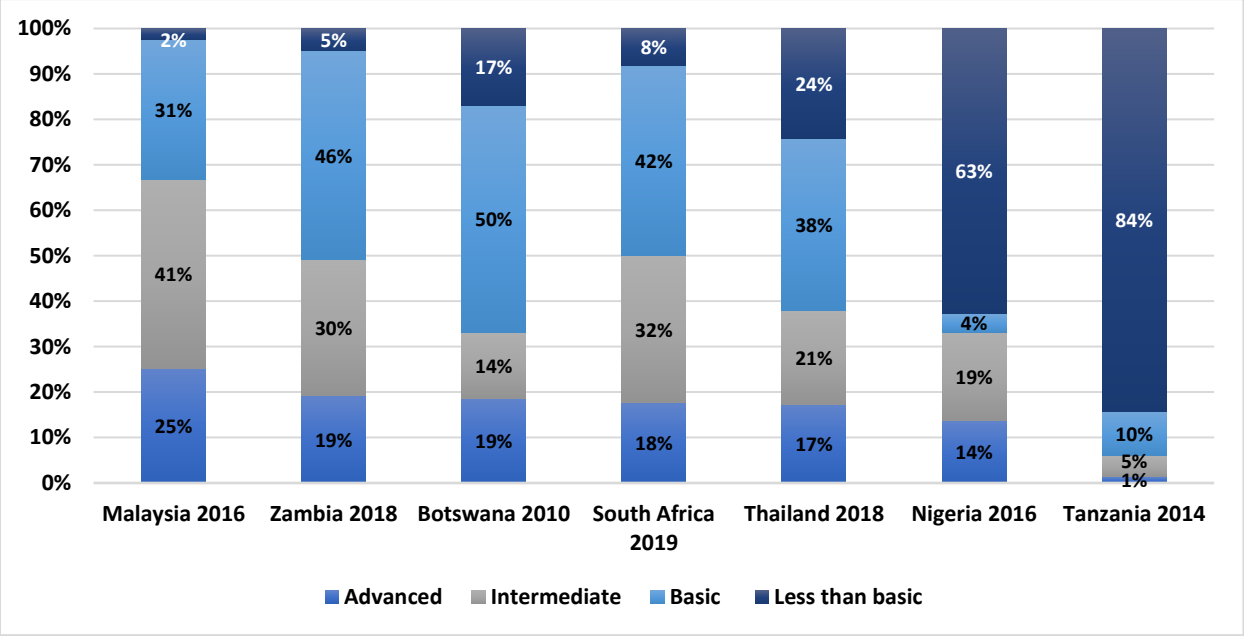
Data source: ILOSTAT database (ILO)

Zambia has a particularly high problem of youth unemployment. 43.5% of Zambian youth were not in employment, education or training in 2017, which is higher than all comparator countries (Figure 15). In Tanzania, for example, the share was 15%. The dilemma is larger in rural areas (45.2% vs. urban: 40.4%) and significantly higher for women: almost every other female youth was not in education or training (further details are provided in Table 28, Appendix A). The government acknowledges the problematic situation and is aware that a large number of youth work informally, particularly in manufacturing, engaging in activities such as furniture making. There are efforts to intervene directly to ensure young Zambians have decent jobs. The 7th National Development Plan has put much emphasis on the creation of youth cooperatives and in further skills development. There is, nonetheless, still significant concern that efforts fall short of creating significant numbers of jobs and that young people are still lacking the skills to drive the economy.

b) Skills

A skilled labor force is an integral part of every economy. It represents one of the most important inputs in every production process and often acts as a driver of innovation, diversification and a dynamic economy. On the other hand, obtaining a certain level of skills increases the opportunities of the individual to obtain a decent job, thus easing the process of inclusive growth. Inclusiveness, employment growth and innovation are all high on the development agenda of the country.

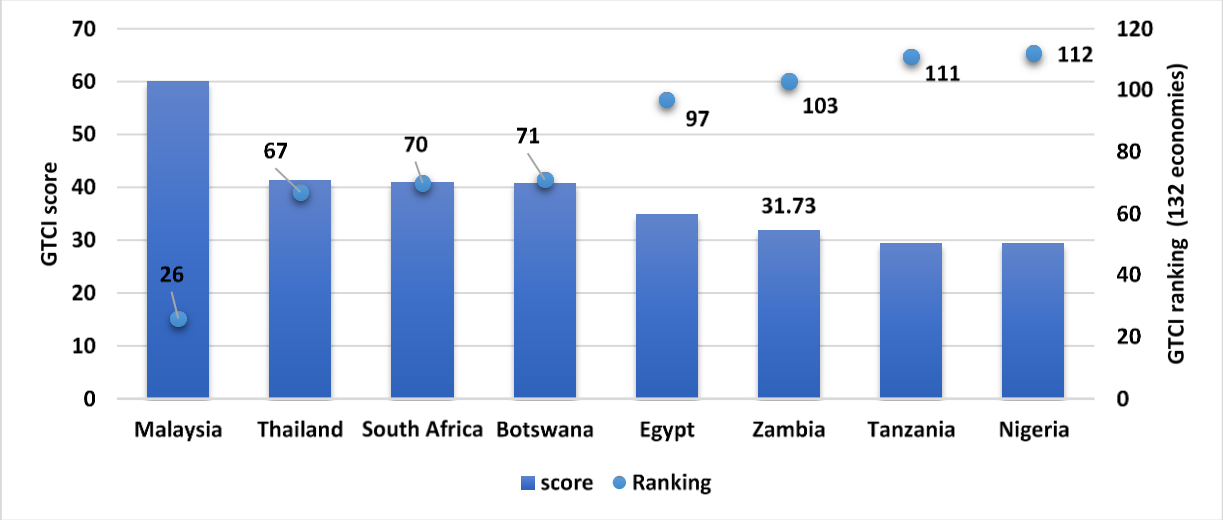
Figure 16 Labor force by level of education (latest year available)



Data source: ILOSTAT database (ILO)

Compared to other countries, Zambia's labor force seems to have a relatively good balance of skilled labor measured by level of education. 19% of the labor force had an advanced level of education and an additional 30% had an intermediate level in 2018 (Figure 16). This is similar to the compositions of employment in South Africa and not far from that of Malaysia. 52% of the male labor force had an intermediate or higher level of education in Zambia, while the share was 43% for women (ILOSTAT database, ILO). This indicates that there is gender skills gap that requires attention in order to reduce gender inequalities and promote economic growth. Often it is not the level of education that marks the difference, but the type of education and skills that the workforce is equipped with. These play an important role in creating an inclusive industrialization trajectory. Block 3 will discuss skills in manufacturing in more detail.

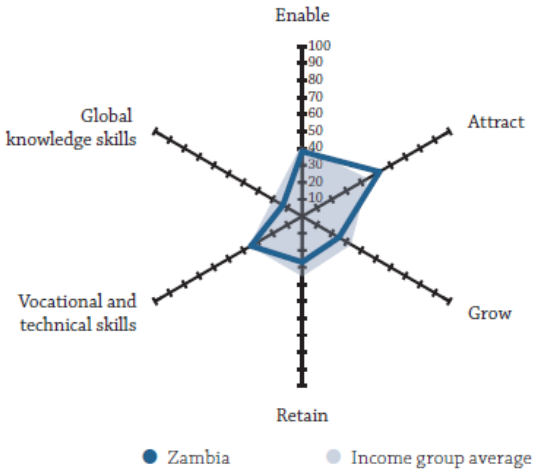
Figure 17 Global Talent Competitiveness Index score and ranking (2020)



Data source: Global Talent Competitiveness Index 2020 (INSEAD)

The Global Talent Competitiveness Index ranked Zambia 103rd out of 132 economies in 2020 (Figure 17). This puts Zambia slightly ahead of Tanzania and Nigeria, though significantly behind South Africa (70) and Botswana (71). The Index measures a range of indicators grouped into six categories, being the capacity of the country to 1) enable 2) attract 3) grow and 4) retain talent, which are considered as input dimensions, and 5) vocational and technical skills and 6) Global knowledge skills as the output dimensions. Zambia received an overall score of 31.73, while the highest score globally is 81.26 (Switzerland) and Malaysia received 60.

Figure 18 Zambia's scores in GTCI compared to lower middle-income average (2020)



Source: GTCI 2020 Report (INSEAD)

In terms of inputs, Zambia scored particularly well – and above LMI average - in attracting talent, where it ranks 54th globally. Growing and retaining talent has been a challenge for the country, ranking 117th and

113th respectively. Regarding the output indicators, a higher ranking and score was given to Zambia for vocational and technical skills (ranking: 91) than for global knowledge skills (108).

While Zambia was performing best in political stability, prevalence of foreign ownership and tolerance of immigrants, it was performing most poorly in innovation output and scientific journal articles and researchers, technology utilization, technicians and associate professionals, ICT infrastructure and tertiary enrollment. This indicates particular challenges the country faces in skills for innovation, much required for a competitive industrial sector and long-term economic growth. It was also performing weaker on active labor market policies, which affects inclusive growth. Similar to the GTCI findings, Zambia ranks 115th out of 141 in innovation capability, and 118th in both quality of vocational training and digital skills in the WEF Global Competitiveness Index (WEF, 2019).

The government specified in the industrial policy and 7th National Development Plan that it will develop industry specific skills for job creation with an emphasis on women and youth. Among some of its initiatives it has set up the Zambian Industrial Training Academy (ZAMITA), which focused on mining and related industries particularly in the area of heavy equipment in the first phase and is focusing on the transport sector in the current second phase. Other centers of excellence include the Kafue Gorge Regional Training Centre (KGRTC), the Zambia Industrial Information and Communication Technology (ICT) Centre of Excellence and the Mopani Central Training Centre. There are also current negotiations on a new Zambian-Finnish Vocational Training and Business Development Centre with NORTEC, the Ministry of Higher Education, Copperbelt University, UNZA and a several Finnish vocational institutions as possible partners.

While there has been an increase in public spending on education, studies have shown that this has not been reflected in the quality of the service mainly due to insufficient number of teachers. The 2015 Public Expenditure Review revealed that improvements can be made in the targeting of beneficiaries from government spending, education delivery and in the implementation of policies. In the budget speech of 2020, the Minister of Finance presented an ambitious plan for improving access and quality of skills, which included technical and vocational education as well as a focus on women (KPMG, 2019). An enhanced move in this direction will be vital to ensure inclusive and sustainable industrialization.

III. Environmental Performance

Climate change has become a major threat to the country's economy in recent years, with prolonged periods of drought, a rise in average temperatures as well as erratic rains leading to floods. Such extreme weather conditions hamper agricultural production and create electricity shortages due to the country's high dependency on hydropower (ITC, 2019). It has had large effects on manufacturing competitiveness of the country, most notably in agro-processing.

In light of this, the government has developed various policies, strategies and programs to address the impacts of climate change, such as the National Policy on Environment (NPE, 2007); the National Climate Change Response Strategy (NCCRS, 2010); the National Energy Policy of 2008; the National Adaptation Plan of Action on Climate Change (NAPA, 2007); the Environmental Management Act No. 12 of 2011; and the Nationally Appropriate Mitigation Actions (NAMAs, 2014). In addition, it established the Zambia Environmental Management Agency (ZEMA) in 2011. Zambia ratified the Kyoto Protocol in 2006 and

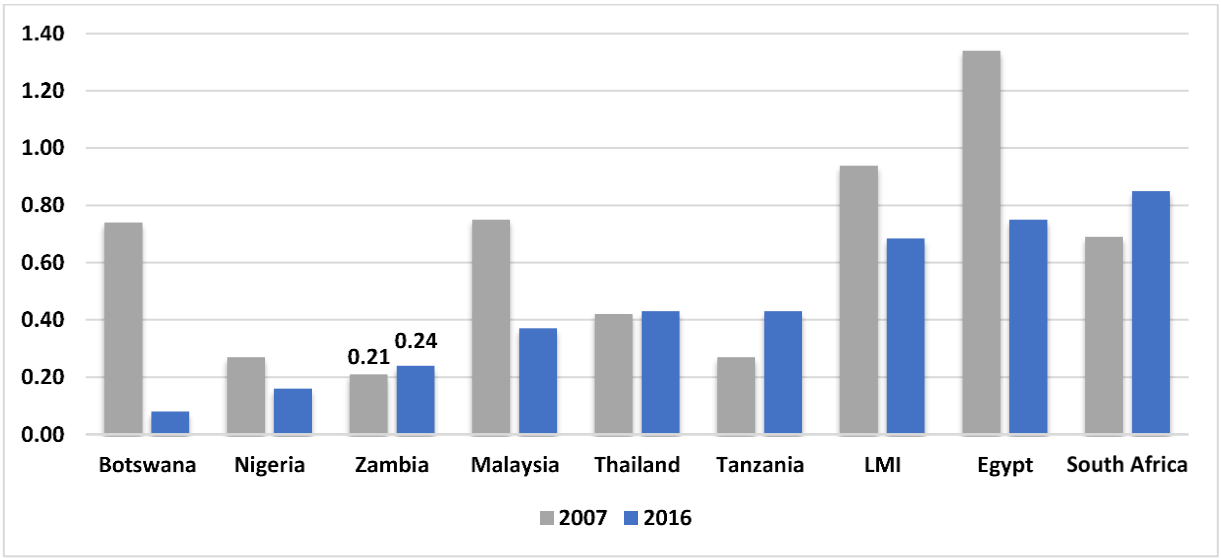
outlined its Intended Nationally Determined Contribution (INDC) to the 2015 Agreement on climate change resulting from the 19th and 20th sessions of the UNFCCC. In May 2019, as part of UNIDO's regional project, the country signed the SADC Centre for Renewable Energy and Energy Efficiency Inter-Governmental Memorandum of Agreement which will coordinate the implementation of the Southern Africa Renewable Energy and Energy Efficiency Strategy and Action Plan (REEESAP) and lead to the development of a national plan. Furthermore, Zambia is also aiming to achieve the targets agreed on in the Stockholm Convention and Montreal Protocol, such as through the implementation of the HCFC phase-out management plan.

The industrial sector needs to ensure that production processes are sustainable to the extent possible, as the sector is generally a significant contributor to climate change globally. Zambia's INDC has both mitigation and adaptation components, with the mitigation component including the reduction of CO2 emissions through sustainable agriculture and forest management, as well as energy efficiency and renewable energy (UNFCCC, 2015). These issues are examined below.

a) Clean production processes

Zambia's CO2 emissions in manufacturing per USD of MVA stood at 0.24kg in the latest year reported, which is 35% that of the average LMI country and lower than most comparator countries (Figure 19). While it has a level that many countries aspire to obtain, the data shows a slight upward trend. To some extent, this is a by-product of increased manufacturing productivity (seen earlier), although the trend remains undesirable. During the same period, Nigeria, for example, has gone from higher CO2 emissions per unit of MVA than Zambia, to a lower level. Malaysia, Egypt as well as LMI countries on average, all show significant decreases of the CO2 emissions while increasing production and maintaining relatively stable productivity levels on average over the years.

Figure 19 CO2 emissions per unit of MVA (Kg of CO2 per USD, constant 2010) (2007 & 2016)[15]



Data source: SDG9 2019 database (UNIDO)

[15] Based on constant 2010 USD values.

The industrial policy made sustainable growth a key consideration which is mentioned in the policy's vision and it has dedicated one of its nine strategic objectives to promoting "environmentally sustainable industrial production". In line with this, the Ministry of Commerce, Trade and Industry and UNIDO are discussing Zambia's possible participation in the UNIDO SADC regional forestry project aimed to revitalize the forest training centers and promote sustainable forestry and wood processing. While data from 2015 shows that degraded land makes up only 7% of total land in Zambia, the forest area within legally established protected areas and the area with a long-term management plan is less than a quarter of total forest area (further details are provided in Figure 27, Appendix A).

Waste management and circular economy

Waste management remains a large issue for Zambia, as for many Sub-Saharan African countries. According to the ZEMA report "Environmental Outlook 4 Report" published in 2017, 68% of waste gets disposed in pits, 25% by dumping and 6% by refuse collection. Informal disposal of waste creates contamination, health risks (e.g. Cholera outbreaks from contaminated water or respiratory illnesses due to open burning) and environmental distress. Expenditure on water treatment, health care and infrastructure such as damaged roads due to blockage of drainage systems, also increase significantly as a result. Rapid urbanization that has been experienced in the country further aggravates the extent and consequences of poor waste management (ZEMA, 2017). Electronic waste (e-waste) has also become a concern for the country. While it was growing rapidly (7% per annum on average between 2010 and 2019 – further details are provided in Figure 28, Appendix A) it causes particularly large adverse effects on the environment and people's health. Sustainable management and disposal of such waste is seen as crucial.

The 7th National Development Plan has a strategy for solid waste management services which focuses on institutional capacity building for such service providers and it also mentions the provision of equipment required and nationwide campaigning about not littering. A number of initiatives have taken place since then. The country's "Make Zambia Clean, Green and Healthy" campaign, for example, has seen the participation of the private sector for waste management enhanced. In December 2018, the Ministry of Water Development, Sanitation and Environmental Protection stipulated several new regulations, including banning the manufacturing and trading of certain single-use plastic carrier bags and the registration of specified packaging material.[16] However, with the country's rapid urbanization and the anticipated industrial and economic growth, efforts to manage waste need to be strengthened. This should include collection, reuse, recycling and treatment of waste, in addition to disposal where otherwise not possible, to create a circular economy. This is particularly relevant and often very economically attractive for manufacturing firms. In terms of e-waste, the first ever Zambian electronic waste management and recycling company (TCH E-Waste) was launched in November 2019 which claims to have the capacity to manage the entire country's e-waste.

Copper recycling

Globally, recycling of metals, including copper, has become an important part of the supply chain. As demand for copper continues to grow substantially and environmental concerns of mining remain, much of the world is recognizing the need to recycle metals. Copper, as well as a few other non-ferrous metals such as zinc and aluminum, have an endless lifespan, meaning they can be perpetually recycled without

[16] Source: http://www.zema.org.zm/index.php/lusaka-3rd-december-2018-issuance-of-statutory-instrument-no-65-on-extended-producer-responsibility-regulations/, Accessed 22 April 2020

losing worth or quality. In addition, the recycling of copper saves up to 85% of energy in the production compared to the extraction of it and emits significantly less CO2 (European Copper Institute, 2018). Creating a circular economy for the copper and other metal sectors is therefore seen as a highly successful sustainable solution to meet the omnipresent and ever-growing demand for these materials.

In fact, roughly 35% of copper used globally and 50% of copper used in Europe derives from recycled scrap (The Guardian, 2014). In China the trend is starting to move in the same direction. Being the largest producer and consumer of copper globally, it is recognizing the high potential of recycling copper to meet some of its growing demand (Liu et al., 2020). Furthermore, the recent trends in global trade due to the COVID-19 pandemic may convince firms to invest in recycling activities as a means of reducing reliance on international sourcing.

While copper mining will remain necessary, the recycling of it will reduce global dependence on extraction activities. It is projected that the increased reliance on the alternative source of copper is likely to push down the price of the extracted material in the future (Sverdrup et al., 2019). Zambia has already begun responding to this trend by banning the exports of metal scrap with the aim of using this as raw material for further value addition in a sustainable and environmentally friendly manner that creates jobs.

However, the establishment of refining plants which convert scrap into newly reusable material requires heavy investment, which is a challenge for many of the Zambian firms operating in the sector. Meanwhile, companies around the globe such as in Europe have developed pioneering technologies to increase efficiency in the recycling process.

In an effort to boost metal recycling while increasing manufacturing production in Zambia, IFC and OFID announced investments of 10 million USD each in 2017 to Metalco Industries Company Limited, a Zambian firm recycling metal scrap and producing manufactured goods such as batteries, aluminium sheets and utensils. The company is expected to establish a copper cable and rod production plant in addition to expanding other operations. Based in Kabwe, it hopes to create over 250 employment opportunities for the local community (IFC, 2017). It would be beneficial to explore further opportunities to recycle metals domestically.

b) Energy

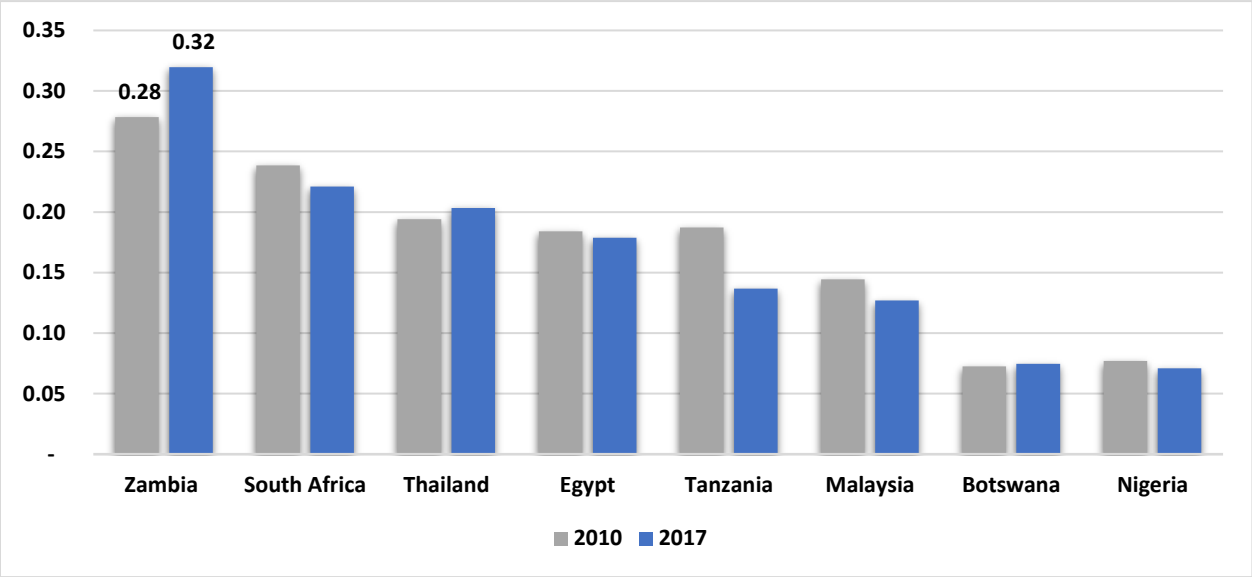
60% of Zambia's population did not have access to electricity in 2017 (further details are provided in Figure 29, Appendix A). In addition, while there have generally been improvements over the years (in 2010 78% did not have access), the second half of 2019 experienced an enlarged electricity deficit. This has large and costly implications on manufacturing firms in particular, as is discussed in Block 3. Production, supply and diversification of energy is a priority for the government. Despite the challenges, the country has abundant natural resources for the production of renewable energy with the possibility of becoming self-sufficient in this regard.

Energy consumption efficiency

Energy efficiency is one key strategy to ensure sustainable growth. Zambia's use of energy for one unit of industry value added was higher than for all comparator countries, with 0.32 kiloton of oil equivalent (Ktoe) used for every one million USD of industry value added (Figure 20). Countries as diverse as Tanzania and Malaysia had levels which are less than half of that. Furthermore, while the energy consumption

intensity was decreasing for a number of countries – including Tanzania and Malaysia – it continued to increase for Zambia.

Figure 20 Ktoe of energy used for one million USD of industry value added (2010 & 2017)[17]

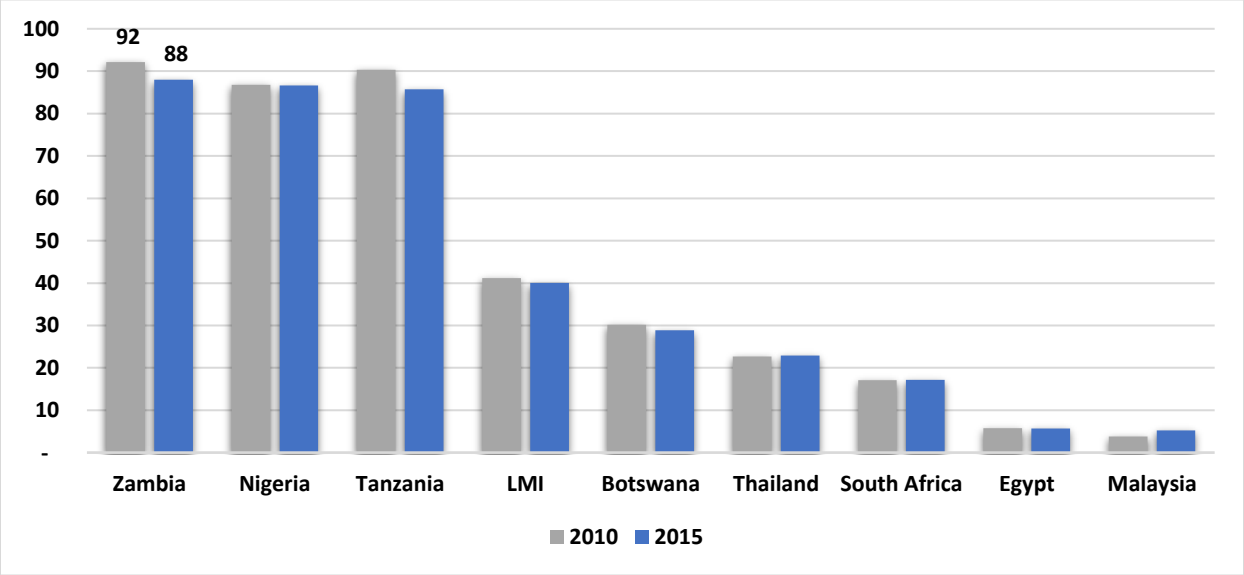


Data source: World Development Indicators (The World Bank) and IEA Database (International Energy Agency)

On the other hand, the vast majority of energy consumed in Zambia in 2015 was renewable (88%), which makes Zambia the highest performer in this regard in comparison to the countries used for benchmarking (Figure 21). The average share for LMI countries was 40%. Roughly 74% of the energy used was biofuels and waste, 13% was oil products and 1% was coal in 2017 (further details are provided in Figure 31, Appendix A). In terms of electricity generation, 86% was hydropower, 9% was coal and 5% oil (IEA database). The data on renewable energy, CO2 emissions intensity and energy consumption intensity indicate that the country has a relatively green (carbon free) energy mix, while also proving to have margin for improvements in the efficiency of the use of energy.

[17] Based on constant 2010 USD values.

Figure 21 Renewable energy sources as a percentage of total energy consumption (2010 & 2015)



Data source: World Development Indicators (The World Bank)

While the government continues to implement hydropower projects such as the Kafue Gorge Lower Hydropower Station Project and the Lusiwasi Upper Hydro Power, the government acknowledges that diversifying the mix of energy sources is necessary to reduce electricity shortages which hurt firms' operations. A number of solar projects, for example, have either been recently completed or are expected to be completed before 2021, such as the Bangweulu Solar Power Plant and the Ngonye Solar Power Plant. The first phase of UNIDO's SHP project has been completed and a proposal for the second phase has been made.

However, as a further attempt to diversify energy sources, Zambia offers proportionately more fossil fuel subsidies than peer countries. The subsidies make up 8.4% of Zambia's GDP, which is higher than for any of the other economies observed. Calculated in per capita terms, Zambia's subsidies are roughly as high as Malaysia's (126 and 129 USD per capita respectively). Further details are provided in Figure 30, Appendix A.

Water resource management

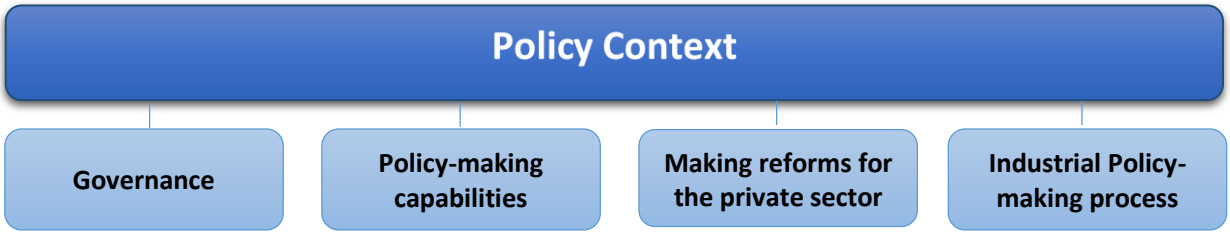
Although diversification of electricity sources is necessary and a government priority, hydropower continues to be the main source of electricity in the country due to the large water reservoirs. The growing climate challenges that led to reduced water supply highlight the urgency to improve water resource management in the country and ensure efficient use of the water reserves (Sladoje, 2016). This is also necessary as firms struggle with water shortages in addition to the power outages, as is identified in the analysis of Block 3.

Some efforts undertaken towards the improvement of water management include the development of the National Water Policy in 2010 and the Water Resources Management Act in 2011, as well as the establishment of the Water Resources Management Authority (WARMA) in 2014. This is in addition to Zambia's regional commitments, such as the SADC Revised Protocol on Shared Watercourses (2000) and

the Regional Water Strategy of 2006.[18] In line with this, the 7th National Development Plan has Development Outcome 7 on "Improved water resources development and management", where strategies include improvements in the harvesting of rain water, promoting local and trans-boundary aquifer management and promoting alternative sources of finance for this cause.

Yet, the main challenges in terms of water resource management remain, with weak water resources infrastructure, low water storage capacity, lack of coordination, insufficient funding and investment in primary water resources and lack of public awareness being some of the main difficulties (Jani, 2018; Uhlendahl et al., 2011). The latest development in the control of water use has been the introduction of a one-off fee for the license of each borehole and a fee for usage of over 10,000 liters per day (Kuanda, 2018). Data from the UNSTATS SDG database shows that Zambia has implemented integrated water resources management to 46%, which places the country at a medium-low level of implementation, marginally higher than Malaysia (43%) though lower than Tanzania (50%) (UN Environment, 2018). Further details are provided in Figure 32, Appendix A.

IV. Policy Context



This section will examine Zambia's governance and policymaking capabilities. It will also assess whether there are any overall constraints in terms of effective governance and citizens' perception of this which may hamper efforts of the government institutions directly involved in industrialization.

The first part of this section will analyze i) the overall governance in the country, to provide context and ii) the policymaking capacities and the outcomes of these, by assessing whether there is a conducive business environment for the private sector. The second part of the section will focus on the industrial policymaking process in specific.

a) Governance and policymaking in Zambia

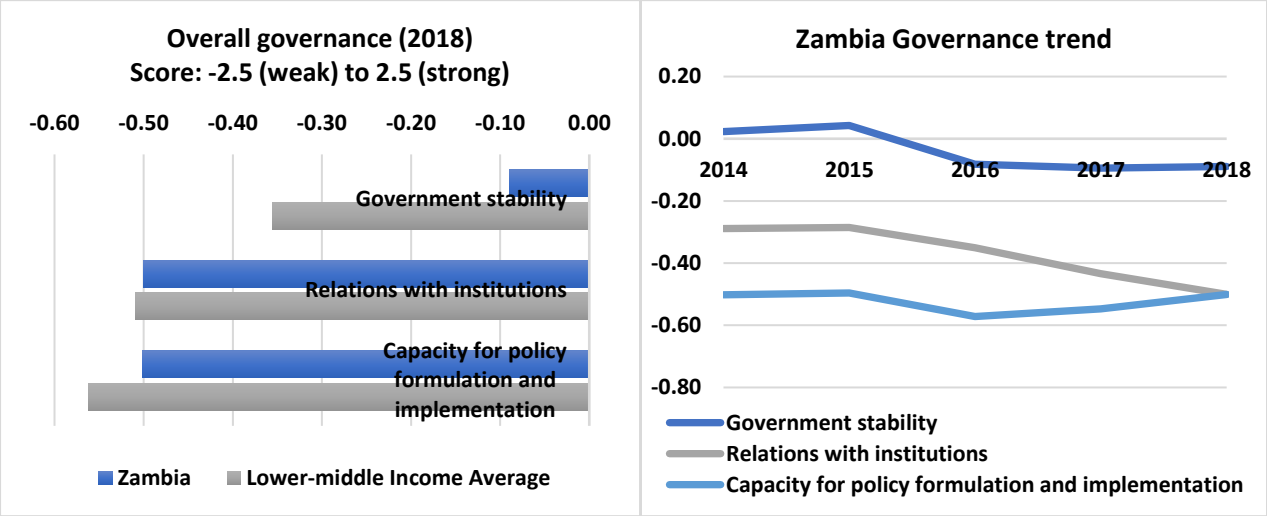
Overall governance

This section looks at three aspects that are important preconditions for effective (industrial) policymaking in the country. Using the World Bank Worldwide Governance Index, Zambia's performance is compared to the average of LMI countries between 2014 and 2018. The index uses a wide range of sources from multilateral organization, think tanks, business information providers and NGOs together with household

[18] Source: https://www.sadc.int/themes/natural-resources/water/. Accessed 14 May 2020.

and firm-level survey data to derive to each of the perception-based indicators (see World Bank, 2010 for more details). Given a score between -2.5 (weak) to 2.5 (strong), the analysis is divided into three topics, each comprising of two indicators. To obtain a score for each topic, an average of the two indicators' scores was taken. Further details on the topics and indicators are provided in Appendix B1.

Figure 22 Zambia vs. LMI average performance of governance by topic (2018)



Data source: Worldwide Governance Index (The World Bank)[19]

The findings reveal that on average, Zambia performed similarly or stronger than the average of LMI countries in terms of governance in 2018, although it is reporting subzero figures in all three topics. It performed highest in "the process by which governments are selected, monitored, and replaced" and by far outperformed the average of its income group. The value was driven by the indicator "political stability", where Zambia showed positive values and ranked 6th highest out of all Sub-Saharan African countries. Political stability has been actively promoted by the leaders in the country, ensuring a distribution of power in economic, political and military offices and the representation of the large ethnic groups in government (Rios et al., 2015).

Zambia had a score of -0.50 for both "relations with institutions" and "capacity for policy formulation and implementation". In terms of the relations with institutions, Zambia seemed to perform just marginally better than the LMI average. Nonetheless, this includes also the one indicator where Zambia performs most poorly: Control of Corruption, where it scored -0.66 and has had a declining trend since 2014. On the Corruption Perceptions Index of Transparency International, Zambia shows similar trends. Corruption impacts heavily on the business environment, with companies facing high red tape[20] and bribery on several of their operations, ranging from company registration, to construction permits and paying taxes. It has also affected customs, putting a strain on international trade. While the country has an anti-corruption act, it does not address facilitation payments or maximum value of gifts allowed.

[19] Note: Interpretation of this data should be done cautiously as the values are estimates.

[20] The issue of red tape is in line with findings from the World Bank Enterprise Survey of 2013, which stated that 10% of the working time of senior management is spent dealing with government regulations, while the equivalent share for the LMI average is 5.7%. In 2019, the share increased to 15% for manufacturing firms.

Zambia performed slightly better than LMI average when it comes to the capacity to formulate and implement policies. There has also been a recovery since the light drop in value in 2015. This is due to the regulatory quality improving, meaning it was felt that policies have been more conducive for private sector development. This is in line with Zambia's scores in the World Bank's Ease of Doing Business indicators, which shows improvements over the years and higher scores than LMI countries on average (Table 4). That being said, there may be some uncertainty felt in recent years regarding macroeconomic policies, as indicated during various conducted interviews. One example is the changes to the tax policy in 2017, which many businesses felt were made with too abruptly.

In conclusion, although Zambia outperforms the LMI average in all three aspects, its relative strength is in the stability of the country. It has seen improvements in regulatory quality, while all other aspects have been weakening since 2014. The largest challenge in the country remains corruption, which has also been deteriorating the fastest.

Policymaking capacities

The present section analyses in more detail the ability of the country to design and implement policies. Eight different indicators are combined to assess five aspects of policymaking: 1. Policy design, which can be disaggregated into 1a) Coordination and 1b) Adaptability and future orientation, 2. Policy Implementation, 3. Monitoring and 4. Learning. The list of indicators can be found in Table 29, Appendix B2.

Table 3 Zambia's policymaking capacities[21]

Aspects	Zambia		LMI		Year1/ Year2	Source
	Year 1	Year 2	Year 1	Year 2		
Policy Design: Coordination	**5.2**	**4.4**	**4.3**	**4.2**	**2014/ 2018**	**BTI Governance Index**
Policy Design: Adaptability and future orientation	**3.9**	**4.3**	**4.0**	**4.3**	**2017/ 2019**	**WEF Global Competitiveness Index**
Implementation	**6.7**	**5.6**	**4.4**	**4.2**	**2014/ 2018**	**BTI Governance Index**
Monitoring	**6.0**	**5.2**	**6.7**	**6.5**	**2015/ 2019**	**Statistical Capacity Indicators**
Learning	**4.4**	**5.6**	**4.3**	**4.1**	**2014/ 2018**	**BTI Governance Index**

Overall, Zambia shows equal or higher capacity for policymaking than the LMI average, with the exception of monitoring. Monitoring, measured by the country's statistical capacity, is not only lower than the average of LMI countries (score of 5.2 vs. 6.5), but also below the score of Sub-Saharan Africa average. The data also shows that the statistical capacity of the country has been deteriorating. The 7th National

[21] Three different datasets are used for this analysis. The methodology of data collection between the different datasets differ widely and warrant a brief explanation: BTI Governance Index – The scoring is done by experts in the respective country, which is then cross-checked several times. WEF Global Competitiveness Index – This is based on World Economic Forum, Executive Opinion Survey. WB Statistical Capacity Indicators - It measures three dimensions: Methodology, Source Data, and Periodicity and Timeliness. It is based on a large number of indicators for each of the topics. It is not based on people's perceptions.

Development Plan as well as the relevant interview respondents recognize the need to improve statistics for evidence-based policymaking. The launch of Zambia's first National Monitoring and Evaluation Policy (2019-2023) in June 2019 indicates that efforts are made in this direction. Monitoring of policies is crucial for effective implementation and to create a positive feedback loop for the formulation of future policies. Such a cycle of evidence-based policymaking can have a profound impact the economic development of a country.

Zambia outperformed the average of LMI countries to the largest extent in policy implementation (5.6 vs. 4.2) and policy learning (5.6 vs. 4.1). In terms of policy implementation, while the government has been able to implement certain policies, it has been unable to implement others - the score is roughly in the middle. The trend, however, has been deteriorating. In regard to policy learning, Zambia was able to achieve strong improvements since 2014. According to the data, the country was able to demonstrate some level of willingness and ability for policy learning, although its flexibility is limited. More recently, certain policy processes have improved in the country. An important change was the decision to have two separate policies for industry and trade, rather than continuing to develop joint ones, as was done prior to 2018. Another example is the formulation of the monitoring and evaluation policy in 2019. There is therefore reason to believe that Zambia's scores for policy learning will further improve as the index is updated.

The country has still margins of improvements in terms of policy design, although performing relatively on par with LMI average. According to the index results, the government institutions "often fail to coordinate between conflicting objectives" and there is little collaboration between the different parts of the government (BTI, 2018). On the other hand, they perform somewhat better in setting priorities and having a long-term vision than the LMI average.

Outcome: Making reforms happen for the private sector

This section assesses the outcomes of the policymaking capacities, that is: Are the adequate business regulations and laws in place to allow businesses to be set up and grow? The analysis is based on the Ease of Doing Business indicators and ranking, which is also used by the country's 7th National Development Plan as a Key Performance Indicator for the strategic area "Creating a conducive governance environment for a diversified and inclusive economy". Zambia's overall score will be compared to the selected peer countries and LMI average across the years (2015-2019). This will be followed by an observation of Zambia's performance in each of the ten topics which constitute the Ease of Doing Business Index.

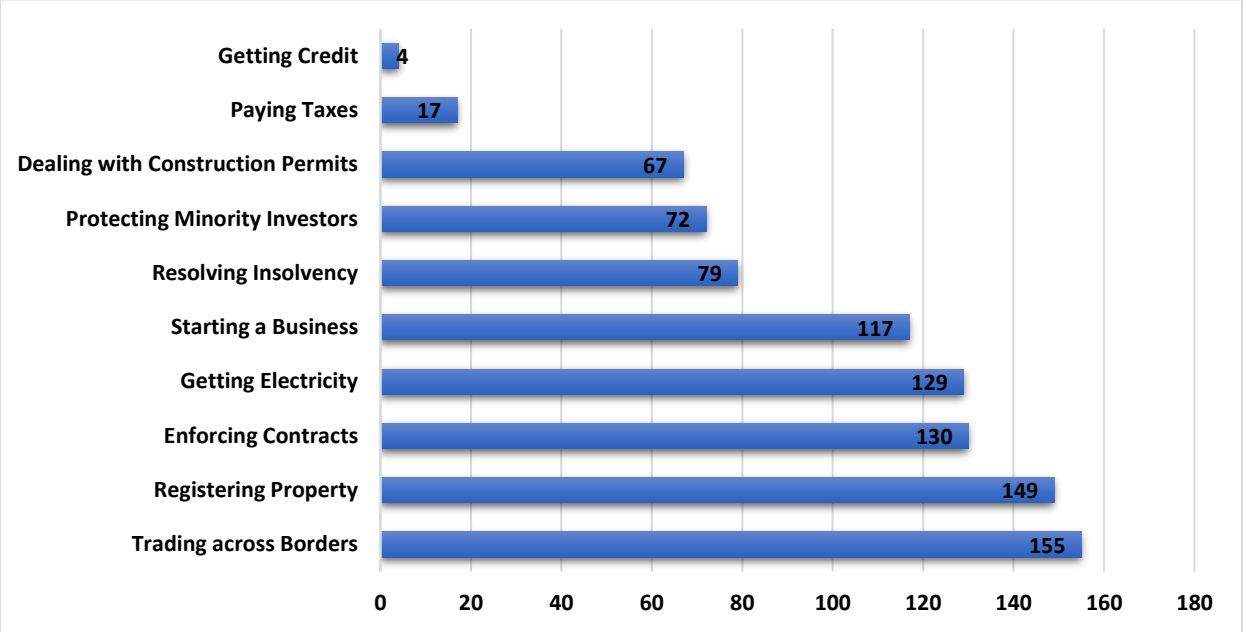
Table 4 Ease of Doing Business scores (2015-2019)

Ease of doing business score (0 = lowest performance to 100 = best performance)						Change in scores (2015-2019)
	2015	2016	2017	2018	2019	
Malaysia	78.6	78.3	78.8	81.3	81.5	2.87
Thailand	71.9	72.8	78.5	79.5	80.1	8.15
South Africa	66.2	65.4	65.3	66.7	67.0	0.78
Zambia	60.5	60.3	64.2	65.7	66.9	6.49
Botswana	65.5	65.6	65.7	66.2	66.2	0.71
Egypt	54.7	55.5	55.8	58.5	60.1	5.35
LMI Average	53.3	54.2	55.4	56.8	58.1	4.74
Nigeria	48.4	48.5	52.0	53.4	56.9	8.50
Tanzania	49.7	53.9	54.0	54.3	54.5	4.77

Data source: World Development Indicators (The World Bank)

Zambia was performing better than the LMI average, Egypt, Botswana and Nigeria in the Ease of Doing Business index, despite these countries having higher manufacturing capacities. The table reveals that Malaysia and Thailand are the top performers from the subset of countries and this is very much in line with the fact that their industrial competitiveness is significantly higher. Their relatively high scores of Ease of Doing Business may be a key contributing factor to why their industries continue to grow at commendable rates. Since 2015 Zambia has continuously been improving in its score, which is promising for the future of its industrial sector. The change throughout the years is larger than that of the change in LMI average and is only surpassed by Thailand and Nigeria from the sample of countries. This reflects the government's efforts in creating a conducive governance environment to sustain and boost economic diversification and inclusive growth. Regulatory and structural reforms took place in 2019 and are expected to continue in 2020 together with the necessary austerity measures (KPMG, 2019).

Figure 23 Zambia's ranking in Ease of Doing Business by its 10 topics (out of 190 economies)



Data source: Ease of doing Business 2020 (The World Bank)

An observation of Zambia's ranking in the ten topics of the Ease of Doing Business will point to key constraints and opportunities resulting from government reforms (or lack thereof). In 2019, Zambia ranked 4th globally in the ease of getting credit. This is measured by combining two different indices: the Legal Rights Index, where Zambia ranks 11 out of 12 and the Credit Information Index, where Zambia ranks 8 out of 8. The former measures the extent to which laws on collateral and bankruptcy protect the rights of borrowers and lenders. The latter measures the availability of credit information to facilitate lending decisions. While this is a result of significant financial sector reforms over decades, the indicator does not in fact measure the extent to which the population has been accessing credit. This has been particularly low. The difficulty of accessing finance is identified as a main challenge to manufacturing firms, as is discussed in Block 3, and is largely due to the high costs involved of obtaining a loan and high requirements for collateral – points which are not considered in the Ease of Doing Business Indicator. This aspect will be discussed in more detail in Block 3.

Zambia ranked 17th in the ease of paying taxes. This is more or less in line with the tax rates and administration not being a large constraint for Zambia compared to LMI average. Zambian firms, however, have the most difficulties with electricity (as was already highlighted in the report), starting a business, enforcing contracts, registering property and most of all: trading across borders. The latter refers particularly to the cost and time to import and export. The fact that Zambia is a landlocked country adds further constraints to firms.

b) The industrial policymaking process

Policy formulation and coherence

There seems to be strong policy coherence in terms of industrialization. The current industrial policy was launched in 2018, the same year as the trade policy and both these policies as well as all others developed since 2017 are aligned to the 7th National Development Plan (which covers the period of 2017-2021) and the Vision 2030 (developed in 2006). Private sector associations and chambers are also invited to the technical working group meetings and often asked to present, as a form of obtaining necessary information.

While the Vision 2030 and National Development Plans are under the responsibility of the Ministry of National Development Planning, both the industrial and the trade policies are led by the Ministry of Commerce, Trade and Industry. The industrial policy was drafted by the Ministry itself, with little technical assistance from outside (e.g. development partners or consultancy firms), based on the notion that policies that are drafted internally tend to have stronger ownership. The private sector has been involved at various stages of the policy design. The draft document was shared with the private sector, civil society and others before the inputs and feedback were consolidated and the final version was developed. The validation process included a technical working group with a wide range of stakeholders.

Research and diagnostics for policy

Evidence-based policymaking means that sound and - to the extent possible - unbiased analysis is undertaken to inform the policymaking process. This is particularly important at the design stage, though almost equally as important throughout policy implementation. Information on the country's industrial performance vis-à-vis other countries of relevance as well as an observation of the country's (and international) trends over time, will ensure the policies developed are ambitious yet realistic and achievable, and that the objectives identified will best contribute to the governments development goals. Such analysis for industrial policy will need to cover a wide range to aspects (e.g. economic, social, environmental), examine different stakeholders' performance and needs and will need to include in-depth assessments of manufacturing sub-sectors to allow for more specific objectives and targeted strategies.

In Zambia, some research was undertaken for the industrial policy formulation, such as an analysis of the 2010 Zambia Business Survey. The policy, however, is anchored to the Vision 2030 and the 7th National Development Plan. It is because of this that the process was more heavily based on consultations than on a quantitative assessment of the industry. The manufacturing priority sectors which were identified in the development plan, received little quantitative reassessment during the design of the industrial policy, although they were meaningfully discussed. Furthermore, the Zambia Institute for Policy Analysis and Research was also an important stakeholder in the drafting process and the Ministry of Commerce, Trade and Industry relied on their inputs.

Collecting information from industries themselves through consultations and carrying out quantitative analysis both have their advantages and hence these activities need to complement each other. Quantitative analysis ensures an assessment is made that is not driven by individual's perceptions and allows for comparisons such as trends over time, benchmarking with other countries and comparisons between sectors. Qualitative information, however, can provide more insight into the observed trends and allows to express felt challenges as well as reveal information that is more current or that cannot be

picked up by data. While Zambia seemed to have undertaken a sound qualitative analysis for its industrial policy, further strengthening the quantitative analysis could prove beneficial for the policy design, implementation, and M&E.

Monitoring and evaluation

Sound monitoring requires a clear understanding of the theory of change or logical framework of the policy, considering how the activities can impact the intervention areas and finally the overall objectives of the policy. It also requires an awareness of the possible synergies as well as trade-offs between different objectives and activities, among other things. A valuable monitoring framework goes beyond a checklist of which programs and projects have been implemented. It should aim to have quantitative indicators at all (or most) levels of the logical framework that can be regularly measured by using the sources it indicates. In addition to this, a clearly spelt out M&E plan or monitoring system, which states the activities to be undertaken for monitoring, the frequency and the institutions responsible for doing so, will ensure accountability and increase likelihood of regular and constructive monitoring takes place. These tools should be developed during the policy-design stage after the comprehensive industrial performance analysis is undertaken.

Furthermore, countries tend to be more successful in achieving their objectives when there is a mindset change from M&E being an activity carried out at the end of the policy cycle that judges performance, to one where M&E is seen as an integral, continuous process of feeding valuable information into the policy cycle. In this way, the information is regularly used to make necessary adjustments to projects, programs and – if necessary – policies, in order to ensure the efforts are on track to achieving the stated objectives.

In Zambia, the monitoring and evaluation (M&E) of the industrial policy is done by the Ministry of Commerce, Trade and Industry. The NIP Implementation plan is structured in a way that supports the monitoring of activities and includes indicators of achievement and responsible institutions. A stronger focus on quantitative indicators, targets and baseline values at impact level – that is, measuring the objectives of the policy, such as yearly developments of the share of manufacturing to GDP or number of persons employed in the manufacturing sector - could help further strengthen the M&E system. This would allow for an evidence-based policymaking process to develop, that relies on a feedback loop, in which the most updated information available is used to alter and improve current or future policies and programs.

Statistics required for industrial policymaking

Evidence-based policymaking requires the availability of reliable and up-to-date information, in both aggregated and disaggregated form. MCTI conducted two industrial surveys so far, one in 2002 and another in 2011. The Zambia Statistics Agency also produces data on the industrial sector. There are, however, margins for improvement in terms of the production, dissemination and use of industrial statistics which would positively contribute to policymaking.

Technical support (traditionally part of the UNIDO portfolio of activities) can be provided to create evidence-based industrial policymaking processes. This is generally offered in the form of capacity building programmes and/or advisory services. The activities are tailored to the specific needs of the country. Regarding statistics, these generally cover strengthening national capacities and supporting in the collection, production and dissemination of industrial data. In terms of policymaking, the activities may include a series of training courses to technical and senior staff in different institutions related to the

analysis of data on a selection of dimensions required to assess industrial competitiveness of a country. Support is also given in the production of relevant analytical outputs such as competitiveness reports, policy and market briefs and background material for decision-makers. Technical support (e.g. through workshops and seminars) is also offered to policymakers and their staff on how to design evidence-based strategies, policies and policy cycles.

SUMMARY OF BLOCK 1 AND IMPLICATIONS FOR PCP PROJECT DESIGN

The analysis undertaken in this section shows that the PCP is very timely. While there have been efforts to near the industrialization objectives of the country and several positive trends can be identified, the country would benefit significantly from all-rounded and well-coordinated support in order to bring the country on track for industrialization.

The manufacturing value added growth rate of 2010 to 2014 slowed down in the recent years, resulting in no significant structural transformation towards manufacturing. Meanwhile, much potential is identified to support value addition, diversification and productivity enhancement through strong linkages with the agricultural, mining and tourism sectors. Diversification away from the reliance of copper mining and related exports (including the recycling and reuse of copper and scrap materials for a circular industrial transformation) remains key. Investments into Zambia have strongly declined in recent years, particularly due to reduction in copper projects, which once again calls for investment promotion for diversification into value addition. Employment creation for youth remains a particular challenge and skills development for inclusiveness and innovation will be vital in the industrialization process. Climate change and weak electricity supply have hampered growth although the country has a high potential to produce alternative and renewable energy. Finally, the political environment and general policy making processes in Zambia seem promising while certain areas of improvements to policy and industrial data production can already be identified.[22]

The analysis, as summarized above, confirms the need to focus on the three priority areas as agreed between the PCP counterparts:

1. Value addition
2. Skills development
3. Industrial policy making

This is in line with the broad objectives outlined in the key policy documents, including the national Vision 2030, the 7th National Development Plan, the National Industrial Policy (2018) as main documents, as well as the MSME Development policy 2009-2019 (currently under revision); the 2018 National Investment Promotion Strategy, the SMART Zambia Master Plan and the National Trade Policy 2018.

Furthermore, a detailed analysis of the above-mentioned documents has led to the identification of five strategic principles of Zambia's industrialization efforts:

1. Value addition activities on primary commodities

[22] UNIDO received official requests from the Government of Zambia for technical assistance related to the revision of the MSME policy and the formulation of the pharmaceutical strategy, for example.

2. Employment creation, innovation and inclusiveness
3. Environmentally sustainable industrial production
4. Investment flows into priority sectors and infrastructure
5. Realistic, implementable and responsive policies and implementation plans

Combining the findings from the above analysis with Zambia's five strategic principles, the conclusion of the section is that the three priority areas of the PCP can be further disentangled into seven different PCP components. While their relevance has already been identified through the analysis of the section, below is a list of these components with more detailed information on the policy relevance.

1. Value chain development
2. Investment promotion for economic diversification
3. Sustainable production processes
4. Clean and affordable energy
5. Industrial skills for innovation
6. Skills for entrepreneurship and employment
7. Evidence-based industrial policymaking and statistics

1. Value chain development

Value addition of primary commodities is the overall objective of Zambia's industrial policy, which states: "To transform Zambia from a producer and exporter of primary products into a net exporter of value added goods utilizing local primary resources with increased citizens' participation." The document has several related objectives, including increasing the growth of the manufacturing sector to 20% and its contribution to GDP to 15% by 2027, with the first strategy, for example, being the identification and support to value chains which are most promising in terms of value addition in the priority sectors. It also suggests certain strategies to promote manufacturing growth such as supporting industrial value chain clusters, cooperatives, Multi Facility Economic Zones and industrial parks for employment creation, as well as having as an objective to develop and implement the Industrial Upgrading and Modernisation Programme which focuses on innovation, research and ICT.

As always, the industrial policy is aligned with the Vision 2030 and the National Development Plans. The former has a vision for the manufacturing sector of being technology based and export oriented, dynamic and competitive, having entities that add value to the local natural resources. In addition to increasing the share of manufacturing to GDP and exports, the focus lies on agro-based and light manufacturing sector by 2030.

The 7th National Development Plan has specific strategies also to facilitate micro, small and medium enterprise development, improve labor productivity and improving competitiveness and access to domestic, regional and international markets. Product diversification away from copper and cobalt is the underlying objective in all related government plans, with value addition of these commodities also being included as one key approach.

2. Investment promotion for economic diversification

The government recognizes the importance of investments, and diversifying investments, as a key strategy at the early stages of industrialization. Vision 2030 recognizes that one of the key areas of

opportunity for industrialization is to encourage foreign direct investment in productive sectors with the focus on knowledge and technology transfer to the locals. Furthermore, Zambia has developed a National Investment Promotion Strategy 2018-2022, with the overall objective of "To mobilise and increase actualized domestic and foreign direct investments by 25 percent annually that supports sustainable socio-economic development."

3. Sustainable production processes

The wider development plan of the country mentions the development of an economy which protects biological systems (Vision 2030) and promotes the production and use of renewable and alternative energy. It also includes as a principle: "Facilitate the adoption of cleaner technologies". In line with this, the government has developed the National Policy on Environment in 2007 and the National Climate Change Response Strategy (2010), the National Adaptation Plan of Action on Climate Change (2007), the Environmental Management Act No. 12 (2011) and the Nationally Appropriate Mitigation Actions (2014).

The topic was also addressed in the Industrial Policy, with sustainable growth being part of the Policy's vision. More specifically, the industrial policy has set as an objective to promote environmentally sustainable industrial production. Its strategies include: (i) Promote environmental certification; (ii) Streamline Environmental Impact Assessment procedures; (iii) Promote compliance to environment management regulations by enterprises; and (iv) Promote capacity building and awareness in industries to enhance environmental protection

4. Clean and affordable energy

The Vision 2030 emphasizes the need to promote the production and use of renewable and alternative energy, as does the 7th National Development Plan, where Development Outcome 4 is the improved energy production and distribution for sustainable development. The country also has the National Energy Policy of 2008 and many of its current efforts are directed towards the production and consequential use of alternative and renewable energy. The Industrial Policy also focuses on alternative energy sources. Under specific objective 8 it states "to facilitate investment in renewable energy" and the importance of energy is repeatedly stated in the document.

5. Industrial skills for innovation

Skills development is identified as a key approach to economic growth of the country. This is evident through the different goals and activities listed in the Vision 2030, such as to "build and sustain human resource capacities and capabilities" and "to acquire and upgrade infrastructure required for training in science and technology and R&D academic institutions" under the economic growth and wealth creation dimension, which is separate from the social investment and human development dimension.

6. Skills for entrepreneurship and employment

A long list of development outcomes and strategies related to increasing employment opportunities and skills upgrading can be found in the 7th National Development Plan which further reiterates the importance of this, with a focus on inclusiveness[23].

The Industrial Policy, in addition to having the guiding principle of inclusiveness of local and foreign, women, youth and persons with disabilities, sets the Specific Objective 2 to "attain 100 percent employment growth in the manufacturing sector by 2027" which includes "Develop sector specific skills and apprenticeship" as a key strategy. Specific objective 9 includes a strategy to "Facilitate increased participation of women and youth in industry" and Specific objective 4 has a strategy on Enhancing capacities of local producers and service providers.

7. Evidence-based industrial policymaking and statistics

Vision 2030 draws the attention on the need to improve the enabling environment for sustainable social and economic development. The 7th National Development Plan has a strategy area on "Creating a conducive governance environment for a diversified and inclusive economy", with Development Outcome 1: Improved policy environment, including Strategy 1: Reform and re-establish inclusive consultative structures and Strategy 4: Enhance national data and information systems. In addition, the strategy area on Economic diversification and job creation includes Strategy 6: Promote economic diplomacy, and Strategy 2: Enhancing policy formulation and analysis under Development Outcome 10: Enhancing research and development.

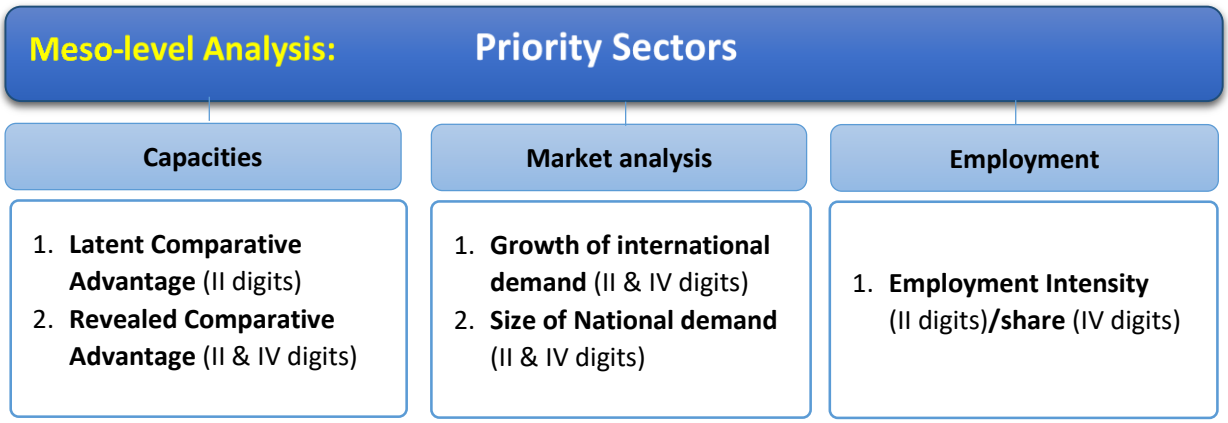
The Industrial Policy focuses most of its guiding principles on policy effectiveness: Realism and Implementability, Responsiveness and Policy predictability. Strategies directly related to policy making are the development and implementation of the local content strategy, the development of a framework for the formalization of MSMEs and the strengthening of monitoring of interventions on mainstreaming of cross-cutting issues in industrial policy implementation.

Furthermore, the Industrial Policy states that "Zambia has significant gaps in the availability of timely and relevant industrial statistics within the data generation chain" and recognises "the need for quality statistics in policy formulation and in monitoring and evaluation of development programmes." (NIP, 2018, p. 11 & 12).

The start of the PCP coincides with three challenging developments: i) the COVID-19 pandemic affecting international production and trade ii) increased climatic changes, and iii) the signing of the AfCFTA. Support during such unprecedented times will have significant impact on the country's industrialization trajectory.

[23] These include: Under Strategic area: Economic diversification and job creation: Development Outcome 9: Enhanced job opportunities in the economy, Strategy 4: Increase employment opportunities in rural areas, Strategy 5: Improve labour productivity and strategy, strategy 6: Promote entrepreneurship skills training and development; Development Outcome 10: Enhanced research and development: Strategy 1: enhance research and development and innovation capacity. Under strategic area Reducing Developmental Inequalities: Development Outcome 1: Reduced inequalities: Strategy 3: Reduced gender inequality, Strategy 4: Enhance income opportunities for poor and marginalised groups; Development Outcome 2: improved education and skills development, mainly Strategy 2: Enhance access to skills training, Strategy 3: Enhance private sector participation, Strategy 4: continuous review of curriculum, Strategy 5: Enhance role of science, technology and innovation.

BLOCK 2: ANALYSIS OF MANUFACTURING PRIORITY SECTORS



The Government of Zambia has selected manufacturing priority sectors, as included in the National Industrial Policy, which are listed in the left column of Table 5 (further details on the aggregation of respective industries are provided in Appendix C). Ideally, the analysis in this section would be done precisely according to this classification. However, due to issues of data availability and correspondence across different classification frameworks, instead the analysis was conducted on sectors that are aggregated in a slightly different way as shown in the right column of Table 5.[24] Almost all the priority sectors (processed food, textile, garments and leather products, wood and wood products, metallic and non-metallic minerals and engineering products) can be discussed by using a II digits corresponding data source except the pharmaceutical sector. The pharmaceutical sector belongs to the chemical sector and will be discussed separately at the end of the chapter. To complete the information, findings about the chemical sector are included in the Appendix 06.

Table 5 Zambia's manufacturing priority sectors and the corresponding sector for analysis

IP priority sectors	Sector aggregates analyzed at II digits level of disaggregation (ISIC rev. 3)
Processed Foods	(15A) Processed foods
Textiles and garments	(17D) Textiles, garments & leather products
Leather and Leather products	
Wood and wood products	(20) Wood and wood products
Mineral (metallic and non-metallic) processing and products	(23E) Oil and non-metallic minerals
	(27) Basic metals
	(28) Fabricated metals
Pharmaceuticals[25]	Subgroup of 24A chemicals: 2423

[24] In addition to the priority sectors, data is available for the Paper and paper products (21) and Printing and publishing (22) sectors as well. Further details on the findings of these two sectors are provided in Appendix 06.

[25] Pharmaceuticals is included in sector (24A) Chemicals, plastics and rubber. However, due to lack of disaggregated data, it is not possible to carry out the foreseen analysis for the pharmaceuticals sector in isolation by using value added. Moreover the pharmaceutical sector is not included in the following Tables 7, 11, 12 because findings would not be fully comparable with those of other sectors as the different level of aggregation.

Engineering Products	(28M-) Medium & high-tech sectors excluding fabricated metals and chemicals

Note: Matching sector for analysis based on data availability. ISIC Revision 3 II-digit codes added in parenthesis. Please note that the medium and high-tech sector cluster 28M contains several ISIC 2-digit industries out of which - whenever sensible - sector ISIC Rev. manufacture of fabricated metal products, except machinery and equipment (28) was extracted to form sector 28M- (further details are provided in Appendix C 3.3). The reason for this is that this sector is more closely connected to manufacturing sector basic metals (27) and is less related to the remaining industries of the medium and high-tech cluster 28M. Sector 28M- can therefore be an estimation of engineering products. It includes the following sectors: Machinery and equipment n.e.c. (29), Office, accounting and computing machinery (30), Radio, television and communication equipment (32), Medical, precision and optical instruments (33), Motor vehicles, trailers, semi-trailers (34).

The sector analysis is conducted along the following three dimensions: (1) Production/export capacity; (2) Market analysis, which identifies a dynamic international market and/or a large domestic demand exists; and (3) Employment Intensity.[26] These concepts are analyzed on the ISIC (International Statistics Industrial Classifications) Revision 3 II-digit level and are further brought down to a more disaggregated level (ISIC Rev. 3 IV-digit) in order to identify subsectors that can be associated with interesting product groups. Such a disaggregated analysis comes at the cost of limited availability of necessary data. This is why only certain elements of the II-digit analysis can be carried over to the more disaggregated analysis on the IV-digit level. Table 6 summarizes the criteria used for the analysis. A key caveat which needs to be pointed out is that all trade analysis is performed on the level of gross exports and imports which, by definition, include re-exports and re-imports, respectively. The reason for this is the observation that re-export and -import data is not readily available for Zambia over time. Also note that whenever talking about trade import/exports related to manufacturing industries, the discussion refers to *traded commodities that can be attributed to a certain manufacturing sector* (further details are provided in Appendix C2*).* Table 7 presents the summary analysis for II-digit priority sectors, while the summary analysis for IV-digit subsectors can be found in Table 8. Further details are provided in Appendix C. Complementing results and explanations on how to interpret them are presented in Appendix D. The following paragraphs discuss the findings for the II- and IV-digit level corresponding to the selected industrial policy priority sectors in a synthetic way.

[26] Because of a lack of data, average employment intensities of lower middle-income countries are used as a proxy.

Table 6 Criteria for sector analysis at ISIC II- and IV-digit level

Indicator	Description	Analysis
Capacities		
Revealed comparative advantage (RCA) > 1	Zambia has an RCA > 1 in a sector if it has developed high capabilities in that sector. The calculations consider 1) the size of the sector and 2) share of the sector in Zambia in total exports compared to the same ratio of world exports. The exercise is conducted by using export statistics for Zambia and at World level for 2018.[27] Further details are provided in Appendix C5. Main data source: United Nations Comtrade Database (UNSD).	**Criterion 1:** II-digit and IV-digit level
Latent comparative advantage (LCA, Real value added below average)	LCA evaluates Zambia's performance relative to the average performance of lower middle-income countries. It identifies if there is an untapped potential for the sector to be filled. The exercise is based on econometric techniques elaborating real manufacturing value added data for Zambia and low middle-income countries over the period 1970 – 2017. Further details are provided in Appendix D2. Main data source: INDSTAT Database (UNIDO).	**Criterion 2:** II-digit level
0.3 < RCA < 1 and positive trend over time	Potential to achieve a revealed comparative advantage in the future is identified for those Zambia product groups where the RCA is above 0.3 and below 1 and where the trend is increasing over the years. The exercise is conducted by using exports statistics for Zambia and at World level between 2005 to 2018. The longer time span is used to reflect the evolution of capabilities which typically requires a longer time horizon.[28] Further details are provided in Appendix C5. Main data source: United Nations Comtrade Database (UNSD).	**Criterion 2:** IV-digit level
Market analysis		
Global demand dynamism	This indicator captures the growth rate of world imports of the sector. It flags the sectors where global demand is fast-growing (above the world import growth rate of the whole world manufacturing sector) and is useful to study sectors with an approach of "hearing the market". The exercise is conducted by using World imports over the period 2010 – 2018 as well as 2010 – 2018. On the IV-digit level, the two IV-digit industries with the highest positive import growth rates for each II-digit priority sector are identified. Main data source: United Nations Comtrade Database (UNSD).	**Criterion 3:** II-digit and IV-digit level
Imports levels Zambia	This indicator captures the size of imports substitution potential for one specific sector. More specifically it measures the size of sectorial Zambia imports per capita relative to the average Zambian imports per capita across manufacturing sectors. The exercise is conducted by using data about Zambia imports for 2018. On the IV-digit level it identifies the two IV-digit industries with the highest imports for each II-digit priority sector. Main data source: United Nations Comtrade Database (UNSD).	**Criterion 4:** II-digit and IV-digit level
Employment		
Employment intensity	This indicator captures the potential of one sector to generate employment per unit of created value added expressed (sectorial employment intensity in Low Middle Income Countries above the average LMI manufacturing employment intensity in 2017). It is useful to analyze the potential of sectors to create jobs and therefore contributes positively to inclusive growth. Main data source: INDSTAT Database (UNIDO), ILOSTAT Database (ILO) and Zambia Statistics Agency.	**Criterion 5:** II-digit level

[27] According to economic theory, a comparative advantage is 'revealed' if RCA > 1. For an RCA < 1, the country is said to have a 'comparative disadvantage' in said commodity or industry. In other words, with an RCA = 1 country i exports as much of good j as would be expected given its overall propensity to export. For example, assume that in 2018, honey represented 20% of world trade with exports of USD 500 billion. Of this, Zambia exported nearly USD10 billion, and since Zambia's total exports for that year were USD25 billion, honey accounted for 10/25*100 = 40% of Zambia's exports. Because 40/20 = 2, Zambia exports twice of what its 'fair share' would constitute. In other words, Zambia has a high revealed comparative advantage in honey and Zambia's RCA for honey is 2.

[28] On the other hand, dynamism is a more flexible concept and therefore a shorter time period (2010 to 2018) is used for the purpose of these analyses.

Employment share in manufacturing > 3%	Identifies sectors that have a particularly high contribution (of at least 3%) in manufacturing that correspond to one of the identified priority sectors. (Main data source: Zambia Statistics Agency data for the year 2017).	**Criterion 5:** IV-digit level

Note: For more information on the analytical part of the meso analysis see Appendix C. Complementing results and explanations on how to interpret them are presented in Appendix D.

Table 7 Summary analysis of II-digit priority sectors

Sector aggregates	Capacities		Market analysis		Employment
	RCA (C1)	LCA (C2)	Global demand dynamism (C3)	Import Levels Zambia (C4)	Employment intensity LMI (C5)
Processed foods (15A)	>1	Below	Above	Below	Below
Textiles, garments & leather products (17D)	<1	Below	Below	Below	Above
Wood and wood products (20)	<1	Below	Above	Below	Above
Oil and non-metallic minerals (23E)	>1	Below	Above	Above	Below
Basic metals (27)	>1	Above	Below	Below	Below
Fabricated metals (28)	<1	Above	Above	Above	Below
Medium & high-tech excluding fabricated metals and chemicals products (28M-)	<1	Below	Below	Above	Below

Note: Only sectors listed where data for all indicators is available. Criterion 1: Column (2) corresponds to results in Figure 36, Appendix D3; note that an RCA < 1 for 28 and 28M- implies an RCA < 1 for 28M. Criterion 2: Column (3) corresponds to column (5) in Table 9. Criterion 3: Column (4) corresponds to column (5) in Table 11. Criterion 4: Column (5) corresponds to column (5) in Table 12. Criterion 5: Column (6) corresponds to column (4) in Table 10. The period chosen for the import CAGR (2010 – 2018) is an orientation time span to capture market dynamics. Changes in the time span could deliver a different set of sectors. Further details are provided in Table 33, Appendix D4.

Table 8 Summary analysis of IV-digit priority sectors

II-digit sector name (ISIC Rev. code)	IV-digit subsector name (ISIC Rev. 3 code)	Capacities		Market analysis		Employment
		RCA (C1)	0.3 < RCA< 1 & pos. trend (C2)	Global demand dynamism(C3)	Highest imports by sector (C4)	Emp. Share > 3% [2] (C5)[29]
Processed foods (15A)	meat and meat products (1511)				X	
	animal oils and fats (1514)	x				
	dairy products (1520)	x			X	
	manufactured grain mill products (1531)	x[1]				6.65%
	prepared animal feeds (1533)			18.82%		
	bakery products (1541)					5.92%
	chocolate and sugar confectionery (1543)			15.64%		
	other food products n.e.c. (1549)					5.06%
	distilling, rectifying and blending of spirits (1551)					3.56%
Textiles, garments and leather products (17D)	already prepared textile fibres or weaved textiles (1711)				X	
	wearing apparel, except fur apparel (1810)					4.75%
	manufactured articles of fur (1820)			39.47%		
	tanning and dressing of leather (1911)			10.48%		
	footwear (1920)				X	3.28%
Wood and wood products (20)	sector sawmilling and planing of wood (2010)			20.63%	X	
	veneer sheets; plywood, laminboard, particle board and other panels and boards (2021)			13.90%	X	
	builders' carpentry and joinery (2022)					4.34%
Oil and non-metallic minerals (23E)	refined petroleum products (2320)			39.43%	X	
	processing of nuclear fuel (2330)	x		45.08%		3.14%
	non-structural non-refractory ceramic ware (2693)					5.25%
	cement, lime and plaster (2694)				X	
	manufactured non-metallic mineral products (2699)	x				
Basic metals (27)	manufactured iron and steel (2710)	x			X	
	manufactured precious and non-ferrous metals (2720)	x		7.89%	X	7.18%
Fabricated metals (28)	steam generators, except central heating hot water boilers (2813)			22.64%		
	cutlery, hand tools and general hardware (2893)				X	
	other fabricated metal products not elsewhere specified (2899)			6.31%	X	
Medium and high-tech sectors excluding fabricated metals and chemical products (28M-)	lifting and handling equipment (2915)		x			
	in agricultural and forestry machinery (2921)	x			X	
	machinery for mining, quarrying and construction (2924)		x		X	
	insulated wire and cable (3130)			24.19%		
	domestic appliances (3150)		x			
	tubes and other electronic components (3210)			69.66%		

[29] Note that in case of non-1-to-1 matches and unless stated otherwise, the broader sector that is partially identified in the correspondence tables is used: ISIC Rev. 4 IV-digit sector 1061 corresponds to ISIC Rev. 3 IV-digit sector 1531 manufactured grain mill products; 1071 to 1541 *Manufacture of bakery products* and 1549 *Manufacture of other food products n.e.c* (matched to 1541); 1079 to 1549 *Manufacture of other food products n.e.c* ; 1101 to 1551 *Distilling, rectifying and blending of spirits; ethyl alcohol production from fermented materials* ; 1410 to 1810 *wearing apparel, except fur apparel*; 1622 to 2022 *Manufacture of builders' carpentry and joinery*; 1629 to 1920 *Manufacture of footwear* and 2029 *Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials* (matched to 1920); 2011 to 1551 *Distilling, rectifying and blending of spirits; ethyl alcohol production from fermented materials*, 2330 *Processing of nuclear fuel* and 2429 *Manufacture of other chemical products n.e.c.* (matched to 2330); 2392 to 2691 *Manufacture of non-structural non-refractory ceramic ware* and 2693 *Manufacture of structural non-refractory clay and ceramic products* (matched to 2693); 2420 to 2330 *Processing of nuclear fuel* and 2720 *Manufacture of basic precious and non-ferrous metals* (matched to 2720).

Note: (1) sector 1531 has typically displayed an RCA > 1 but has recently experienced a sharp drop in the RCA to a value below 1 in the year 2018 which can be attributed to abnormal weather events.[30] (2) The Zambia Statistics Agency sector employment data is provided in ISIC Rev. 4 whereas the classification presented in this section follows ISIC Rev. 3. Concordance between both classifications was established using the correspondence tables from UNSTAT (https://unstats.un.org/unsd/classifications/Econ/isic).

I. Processed foods

Zambia has had a stagnating level of production in the processed foods and beverages sector, producing per capita less than the average lower middle-income country by the end of 2015; see Table 9 and Table 31, Appendix D2) for more information. On the export side the sector seems to have a revealed comparative advantage (RCA value of 2.8; Further details are provided in Figure 36, Appendix D3). Further analysis at the IV-digit level hints that this seems to be driven by three subsectors (see also Table 8): manufactured vegetable and animal oils and fats (1514), dairy products (1520) and manufactured grain mill products (1531). The RCA of manufactured grain mill products experienced a sharp drop in the year 2018 which can be attributed to abnormal weather events.[31] This is particularly noteworthy as this sector has one of the highest employment shares of all IV-digit industries within manufacturing.

Table 9 Latent Comparative Advantage (LCA) of manufacturing industries

Sector aggregates	Reported VA Zambia	Predicted VA LMI	VA gap	Criterion 2
Processed foods (15A)	39.08	46.84	-7.76	Below
Textiles, garments & leather products (17D)	0.58	16.91	-16.33	Below
Wood and wood products (20)	2.79	4.36	-1.57	Below
Oil and non-metallic minerals (23E)	17.37	22.88	-5.51	Below
Basic metals (27)	48.83	9.08	39.75	Above
Fabricated metals (28)	4.19	3.81	0.38	Above
Medium & high-tech sectors excluding fabricated metals and chemicals (28M-)	9.77	29.27	-19.50	Below

Note: 'VA': Real value added. There, column 'VA gap' corresponds to the difference in real value added between the most recent reported value added figure of any of the ten Zambian manufacturing sector aggregates (column 'Reported VA Zambia') and that of the model estimates of an average lower middle-income country *at similar per capita GDP levels, with a similar endowment structure and a similar point of time* (column 'Predicted VA LMI'). Column (5) indicates above/below average level if column (4) is positive/negative. When for a certain sector the performance of Zambia is below the average performance of LMI countries at the current Zambia income level, this flags a worse performance of Zambia than an average LMI and an untapped potential to fill. For a more detailed and technical discussion please see Appendix D2 which also contains information about the comparison between a dynamic performance of Zambia with that of the model estimates of an average LMI country *at similar per capita GDP levels, with a similar endowment structure and a similar point of time* over time. Only sectors are listed where data for Zambia is available.
Data source: INDSTAT database (UNIDO)

[30] See https://www.lusakatimes.com/2018/05/09/maize-production-for-2017-2018-season-reduces-by-33-6/ and https://www.lusakatimes.com/2018/01/23/zambia-drought-slash-2018-maize-output-around-50-percent/. Accessed 29 April 2020.
[31] Source: https://www.lusakatimes.com/2018/01/23/zambia-drought-slash-2018-maize-output-around-50-percent/ . Accessed 29 April 2020.

The high growth in international demand (Table 11), which is particularly pronounced for LMI countries (Figure 34, Appendix D1), as well as the relevant national demand even though below the average (Table 12) for such products, indicates that increasing production of the sector would positively contribute to economic growth. Further developing agricultural value chains would, of course, support those working in rural areas, which make up a significant portion of the population and of the poor. It would contribute positively to food security, lower vulnerability to climatic shocks and employment (Table 10).

A IV-digit analysis using trade data reveals that dairy products (1520) are among the most imported products of the processed food sector in Zambia, along with meat and meat products (1511). The subsectors with the fastest growing international market are cocoa, chocolate and sugar confectionery (1543) and prepared animal feeds (1533), growing at annual rates of between 15% to 18%. While the highest employment shares in this priority sector can be attributed to manufactured grain mill products (1531) as well as bakery products (1541) and other food products n.e.c. (1549); see Table 8.

II. Textiles, garments and leather products

Zambia has had a weak and sharply declining production capacity in the textiles sector, far below expected levels compared to real value added data of lower middle-income countries (Table 9 and Table 31 Latent Comparative Advantage (LCA) of manufacturing industries, trend, Appendix D2). The low exports of the sector mirror the low production levels. Zambia's RCA value is 0.1 (Figure 36, Appendix D3), which is the lowest of all priority sectors. The textiles sector is, however, known to be a sector that can potentially generate large-scale employment and generally provides opportunities for people with lower levels of skills. This is confirmed by the relatively high employment intensity of the sector in lower middle-income countries (Table 10). On average for LMI countries, 19 people are employed to produce one million USD of value added. Whereas data point out the Latent Comparative Advantage of textile being a sunrise low tech industry with an untapped potential to fill compared to other LMI countries, it remains unclear whether the sector can really act as an engine for growth for countries at early stages of industrialization the way it did for earlier industrializers (among others, see discussion in Rodrick, 2016). What is more, national data by the Zambia Statistics Agency reveals that the textile sector has collapsed to a mere 5% of its 2000 Index of Industrial Product (IIP) index which, together with the big impact second hand clothing plays in Zambia, paints a rather bleak picture for this particular industry: While imports of textiles, garments and leather products were lower than for the other priority sectors , the national demand for second-hand clothing (commonly named Salaula in Zambia) remained high. It is worth noting that 2nd hand clothing made up for the largest share (around 28%) of textile-related imports[32] in 2018; further details are provided in Figure 37, Appendix D5.

At the same time, global demand for the sector saw a decline of 0.96% between 2010 and 2018 (Table 11). Zambia imports in this sector are below the national manufacturing average (Table 12) and grow less than average global and LMI trends (Figure 34, Appendix D1). While the need to create employment opportunities in the country is high, the potential to revamp the sector remains a challenge as local manufacturers compete with high quality and low-priced imported used clothing – a challenge felt in many

[32] Textile-related imports' encapsulate all traded commodities that can be attributed to manufacturing priority sector textiles and garments plus leather and leather products (17D) plus commodities that can be associated with 2nd hand clothing (SITC Rev.: 269 - Old clothing and other old textiles articles; rags) that otherwise are classified as 'manufacturing not else classified' in sector 36 according to ISIC Rev. 3.

Sub-Saharan African countries. Currently Zambia does not have a revealed comparative advantage in any of the sector's IV-digit subsectors (see Table 8). The country, however, mostly imports already prepared textile fibres or weaved textiles (1711) as well as footwear (1920) the latter of which is also found to have a notable employment share of above 3% in 2017 according to official Zambia Statistics Agency figures. Another sector with a high employment share is wearing apparel, except fur apparel (1810). Furthermore, tanning and dressing of leather (1911) has a global demand that is growing at 11% per annum and manufactured articles of fur (1820) which is has been growing very dynamically (at almost 40% per annum) since 2010.

Table 10 Employment intensity

Sector aggregates	Zambia	LMI av.	Global av.	Criterion 5
Processed foods (15A)	15.39	5.97	3.87	Below
Textiles, garments & leather products (17D)	101.47	19.13	10.11	Above
Wood and wood products (20)	68.34	69.00	17.85	Above
Oil and non-metallic minerals (23E)	11.72	3.70	2.26	Below
Basic metals (27)	5.02	8.70	6.05	Below
Fabricated metals (28)	22.69	2.04	1.96	Below
Medium & high-tech sectors excluding fabricated metals and chemicals (28M-)	10.53	12.92[33]	6.52	Below

Note: 'Global av.': Global average. 'LMI av.': Lower-middle income country average (World Bank, 2020). Criterion 5: Sector LMI av. above/below average LMI employment intensity of manufacturing in 2017. Note: To guarantee consistency, the employment intensity analysis is conducted on the basis of LMI and global averages as they share a common data source. Average global (LMI) employment intensity (million USD) in 2017 of manufacturing: 5.92 (13.80). Employment intensity defined as:
$EI = employment/value\ added\ (in\ million\ USD)$
Data source: Employment: Zambia Statistics Agency, ILOSTAT database (ILO); Value added: INDSTAT database (UNIDO)

[33] The high labor intensity for LMI countries in medium & high-tech sectors excluding fabricated metals and chemicals (28M-) relative to processed foods (15A) for LMI countries is the result of averaging across LMI countries. For outlier-robust aggregation (e.g. via the median) processed foods (15A) is found to have a higher labor intensity than medium & high-tech sectors excluding fabricated metals and chemicals (28M-).

Table 11 Global demand dynamism (Compound annual growth rates of imports)

Sector aggregates	Zambia	LMI av.	World av.	Criterion 3
Processed foods (15A)	1.94	8.97	3.67	Above
Textiles, garments & leather products (17D)	-2.28	6.42	-0.96	Below
Wood and wood products (20)	7.37	25.45	9.90	Above
Oil and non-metallic minerals (23E)	4.58	8.28	5.08	Above
Basic metals (27)	-7.13	3.97	2.64	Below
Fabricated metals (28)	3.14	8.82	5.43	Above
Medium & high-tech sectors excluding fabricated metals and chemicals (28M-)	1.85	5.31	1.93	Below

Note: 'World av.': World average. 'LMI av.': Lower-middle income country average (World Bank, 2020). Column (5) compares II-digit CAGRs in column (4) with the global manufacturing import CAGR which is 3.36% for the period 2010 to 2018. The period chosen for the import CAGR (2010 – 2018) is an orientation time span to capture market dynamics. Changes in the time span could deliver a different set of sectors. Further details are provided in Table 33, Appendix D4.
Data source: United Nations Comtrade Database (UNSD) and World Development Indicators (The World Bank)

III. Wood and wood products

The wood processing sector is a key sector for employment creation as it has by far the largest employment intensity of all manufacturing sectors as can be seen in Table 10. This makes it very attractive for Zambia in order to address the high unemployment rate of the country, particularly among youth. In Zambia, the sector is still performing below predicted manufacturing value added levels of Low Middle Countries that reveals an untapped potential to fill in this sector (Table 9). However, the wood sector does not show to have revealed comparative advantage in terms of exports (Figure 36 Revealed Comparative Advantage (RCA) Zambia 2018, Appendix D3). Nonetheless, in addition to high potential to create jobs, the global demand for the sector is growing above average rates, at 9.90% between 2010 and 2018 (Table 11), indicating a possible market to tap into. At the same time Zambia's imports in this sector remain below the average imports across all other Zambian's manufacturing sectors (Table 12).

The IV-digit subsector which seems to be most interesting in terms of demand is veneer sheets; plywood, laminboard, particle board and other panels and boards (2021), which have both a dynamic international market as well as large import demand from Zambia. The sector IV-digit sector sawmilling and planning of wood (2010) seems to have a large domestic market and is also growing rapidly in terms of global demand since 2010. What is more, builders' carpentry and joinery (2022) is found to hold a notable share in manufacturing employment in 2017 of somewhat over 4.3% according to official Zambia Statistics Agency figures. Further developing the production of these subsectors would therefore either cater for import substitution or to tap into the attractive global market. At present, Zambia does not have a revealed comparative advantage in any of the mentioned subsectors (Table 8).

IV. Mineral processing and products

a) Basic metals

As expected, Zambia has a particularly high revealed comparative advantage in the basic metals sector, where copper is contained (RCA value of 75, see Figure 36, Appendix D3). Its production in comparison to the average of lower middle-income countries at the same level of development is also extraordinarily high (Table 9). What is more, national data by the Zambia Statistics Agency reveals that the basic metal sector has skyrocketed to an impressive 400% of its 2000 Index of Industrial Product (IIP); by far the biggest increase among all recorded sectors over the same period.[34] The sector contributes to GDP more than five times the amount of the average LMI and the sector is continuing to grow. In addition, the global market for basic metals is large and is increasing at roughly 2.64% per annum between 2010 and 2018 (see Table 11), though Zambia's imports levels in that sector are below the national manufacturing average (Table 12) and Zambia´s import growth rates are negative between 2010 and 2018. The strong drop in imports can mostly be attributed to the period after 2015 (Figure 34, Appendix D1). While the sector's performance is driven by copper production, diversification within the sector could contribute to helping the economy grow while reducing reliance on copper.

According to the available trade data, Zambia seems to have a revealed comparative advantage in the two subsectors[35] manufactured iron and steel (2710) and manufactured precious and non-ferrous metals (2720). Sector manufactured precious and non-ferrous metals (2720) exhibits growing international demand for the period analyzed (Table 8). Sector manufactured precious and non-ferrous metals (2720) also reported the highest employment share of all IV-digit manufacturing industries in 2017 according to the Zambia Statistics Agency figures.

b) Fabricated metals

Zambia is also successful in the further processing of the metals, although to a lesser extent. Production levels are just slightly above LMI average (Table 9) and on the export side Zambia does not have a revealed comparative advantage in fabricated metals (see Figure 36, Appendix D3). However, both global and national demand are fast growing, with 5.43% and 3.14% per annum growth respectively between 2010 and 2018, as can be seen in Table 11. Zambia is characterized by an import level in fabricated metals above the manufacturing average across manufacturing sectors (Table 12). The availability of the natural resources and the success with the metal production and exports in basic form makes it inevitable for the country to aim to increase activities related to further value addition to the products and exploit the fast-growing markets. Nonetheless, employment intensity tends to be particularly low in this sector (Table 10).

[34] The second and third most notable sectors in terms of their index growth are processed foods (ISIC Rev. 3 15A) with around 270% as well as wood and wood products (20) and paper products (21) with both around 244% of their production in 2000 according to official Zambia Statistics Agency figures.

[35] Following Affendy, Sim Yee, and Satoru (2010) all traded commodities that can be attributed to sector basic metals (27) are classified either to belong to manufactured iron and steel (2710) or to manufactured precious and non-ferrous metals (2720).

The fabricated metals that have the largest domestic demand are cutlery, hand tools and general hardware (2893) and other fabricated metal products not elsewhere specified (2899). The latter is also among the subsectors with the highest growth rate in global demand within the sector (6.31%, Table 8 Summary analysis of IV-digit priority sectors). More detailed analysis would be necessary to reveal the specific type of products under this subsector. In addition, steam generators, except central heating hot water boilers (2813) had a global demand growth rate of well above 20% per annum since 2010. It could be interesting to further explore the demand and opportunities in this subsector in particular. According to the export data, it seems Zambia does not have a revealed comparative advantage in any of the subsectors of fabricated metals.

c) Oil and non-metallic minerals

Although Zambia has a revealed comparative advantage in the exports of refined oil and non-metallic mineral products, it has a latent comparative advantage in terms of its production, where values are still below expected for Zambia (see Table 9). The growth in production, however, has been faster than the average lower middle-income country at that level of income, indicating that Zambia may be able to match the expected values in the near future if trends continue (see Table 31, Appendix D2). In addition to a rapidly increasing global market (5.08% between 2010 and 2018 as in Table 11), Zambia's imports (Table 12) as well as import growth rates in this sector are also noteworthy. In fact, Zambia's import index for this sector is notably higher than for the global or LMI average indicating that Zambia's imports in this sector have almost consistently surpassed that of other LMI countries since 2005 (see Figure 34, Appendix D1). The analysis shows that similarly to the fabricated metals, untapped potential is observed in this sector. Developments seem promising and this too would contribute to the diversification and value addition of Zambia's mining sector despite the somewhat lower employment intensity reported for LMI countries (Table 10).

The data (Table 8 Summary analysis of IV-digit priority sectors) shows that Zambia's revealed comparative advantage in this sector is driven by exports of the subsector other manufactured non-metallic mineral products (2699), where it has a growing RCA value and of above 1 since 2015. An RCA > 1 is also recorded for processing of nuclear fuel (2330) which has also seen an increase in global demand with a 45% average annual growth since 2010. Similar growth dynamics (39.43%) is recorded for refined petroleum products (2320) which also has a large national demand (measured in terms of imports), showing signs of promising markets. Imports of the subsector cement, lime and plaster is also very large (2694). Among the sectors with a particularly high share in manufacturing employment (above 3%) is non-structural, non-refractory ceramic ware (2693) with a share of 5.25% in 2017 according to the Zambia Statistics Agency figures.

Table 12 Import Levels 2018

Sector aggregates	Zambia	LMI av.	World av.	Criterion 4
(15A) Processed foods	0.119	0.723	3.354	Below
(17D) Textiles, garments & leather products	0.044	0.250	1.390	Below
(20) Wood and wood products	0.045	0.299	1.817	Below
(23E) Oil and non-metallic minerals	0.302	0.550	3.069	Above
(27) Basic metals	0.132	0.483	4.933	Below
(28) Fabricated metals	0.182	0.415	3.194	Above

(28M-) Medium & high-tech sectors excluding fabricated metals and chemicals	0.251	0.422	3.148	Above

Note: 'World av.': World average. 'LMI av.': Lower-middle income country average (World Bank, 2020). Column (5) compares the sector values of (2) with the average of (2) which is 0.17.
Data source: United Nations Comtrade Database (UNSD) and World Development Indicators (The World Bank)

V. Medium and high-tech sectors excluding fabricated metals and chemical products

This sector mainly includes machines, equipment and transport equipment of all types.[36] Zambia has a latent comparative advantage in the sector (see Table 9); however, the production trends do not indicate that it will be able to catch up to the expected value if the trends continue (see Table 31, Appendix D). The sector is also characterized by a large demand for imports. In terms of exports, the RCA value is also still low. While there has been an above average growth in international demand for this sector between 2005 to 2018 (4.9 % annual growth rate on average and a 7.58% growth rate for national demand; see Table 33, Appendix D4), this development has somewhat cooled off since the early 2010s with global average annual growth rate of 1.93%; see Table 11. Additionally, while employment intensity is slightly below the average of manufacturing, it is still relevant in lower middle-income countries (Table 10). Supporting the development of this sector may therefore have multiple benefits, including creating employment and satisfying a large and fast growing local (Table 12) and international demand, in addition to creating an industrial sector that is more sophisticated and resilient.

The export data indicates that Zambia may have a revealed comparative advantage in agricultural and forestry machinery (2921). In addition, although the RCA of lifting and handling equipment (2915), machinery for mining, quarrying and construction (2924) and domestic appliances (3150) are not above one, they have a positive trend (and are above 0.3), indicating there is potential for these subsectors to have a revealed comparative advantage in the future, given current developments. Nonetheless, as mentioned earlier, export data does not disassociate re-exports, impacting on the assessment of the country's capabilities. The country's large imports are agricultural and forestry machinery (2921) and machinery for mining, quarrying and construction (2924). Since 2010 the two most dynamic sectors in terms of global market dynamism are insulated wire and cable (3130) as well as electronic valves and tubes and other electronic components (3210); see Table 8.

VI. Pharmaceutical sector

The sector ISIC rev. 3 (2423) includes pharmaceutical, medicinal chemical and botanical products. The RCA of this sector is very low (0.0024) as the current low capability in this field and low capacity to export in the international market. The lack of data at IV digits level does not allow completing the analysis of

[36] In the hypothetical scenario that sector 28 and 28M- would have been analyzed jointly as sector aggregate 28M the results for the IV-digit analysis presented in Table 8 would change as follows: 'RCA > 1': no changes; '0.3<RCA<1 & pos. trend': no changes; 'Global demand dynamism': only insulated wire and cable (3130) as well as electronic valves and tubes and other electronic components (3210) identified; 'Highest imports by sector': only machinery for mining, quarrying and construction (2924) as well as other fabricated metal products not elsewhere specified (2899) would be identified; 'Employment share >3%': no changes. The results for sector 28M would be the same as for sector 28M- at II-digit level. That is: LCA: Below, RCA: <1, Global demand dynamism: Below, Import levels Zambia: Above, Employment intensity: Below.

capabilities discussing value added performance. Over the period 2010 – 2018 the sector has been characterized by a certain level of dynamism of world exchanges as the growth rate of world imports was about 3% around the world manufacturing products imports level. This shows that the sector has a certain vitality. According to the statistics provided by the Zambia Central Statistics Office the sector employs only about 1% of manufacturing employment. As other medium and high tech sectors the pharmaceutical sector may not be among the top employment absorbers even though it could strategically be very relevant to replace imports with national production. Data reveal that in the chemical II digits sector pharmaceutical is the one characterized by the highest level of imports. There is a relevant national demand that could be matched by developing local industry. Social benefits could also derive from the production of goods at affordable prices. Access to affordable medicine is a challenge for Zambia as is for many developing countries. Zambia imports the vast majority of medicines and pharmaceutical products. In 2018, 56 % of imports came from India and 6 % from South Africa. Throughout the past three decades the local production of pharmaceuticals was declining and in 2011 only 223 out of more than 4,000 registered medicines were produced domestically (Kachali et al., 2014).

Developing a pharmaceuticals sector which can produce inexpensive and quality-assured generic medicines could have various positive effects on the economy and society, including improved health of the population contributing to poverty reduction, increasing manufacturing production in a high-skilled sector and creating jobs. A local company in the Philippines, for example, was gradually able to obtain a significant market share in generic drugs which was previously dominated by expensive international brands (UNIDO, 2018). Having a domestic pharmaceuticals sector is particularly relevant when countries face health challenges such as the current COVID-19 pandemic. In such cases, it is the pharmaceuticals sector that shows the highest demand and growth (UNIDO, 2020).

With increased emphasis on the need to develop a Zambian pharmaceuticals sector, Kingphar Pharmaceutical was commissioned in 2018, creating 200 jobs with the aim of providing oral and injective drugs. It was seen as a boost to a young pharmaceuticals sector in the country and it was hoped that skills acquired within the company would be used to further develop the sector in the future.

The liquidation of the company in April 2020 indicated that challenges still remained such as those of inadequate infrastructure, lack of required skills as well as weak regulatory capacity on pharmaceutical standards (as highlighted in Kachali et al., 2014). The study by Kaplan (2011) warned that producing locally at competitive prices can be a challenge for many developing countries due to constraints such as the ones experienced in Zambia.

Developing a robust pharmaceutical sector domestically will likely not be a short-term activity, but will require significant investments in human capital, infrastructure and a conducive environment. The gains of achieving competitiveness in the sector, however, would be large. Beyond the domestic market lies a large and fast-growing regional market that pharmaceutical firms could tap into. Table 13 presents the growth in demand for pharmaceuticals.

Table 13 Share and growth of imports of medicaments (2010 – 2018)

	Medicaments as a share of total Mnf imports (2018)	CAGR of imports (2010-2018)	
		Manufactured goods	Medicaments
Zambia	2.7%	8%	12%

SADC	2.8%	1%	4%
COMESA	3.2%	0%	3%

Data source: United Nations Comtrade Database (UNSD)

SUMMARY OF BLOCK 2 AND IMPLICATIONS FOR PCP PROJECT DESIGN

The priority sectors identified by the Zambia Industrial Policy 2018 (II digits level) are supported by the economics rationale in terms of either revealed comparative advantage, representing the presence of existing capabilities, latent comparative advantage, identifying the need to fill untapped potential, or high employment intensity, to contribute to employment creation and inclusive industrialization. Some of the priority sectors also offer interesting opportunities in terms of imports substitution and dynamism in global market.

Even though the extractive industries, and within manufacturing particularly sector basic metals (27), can be identified as one of the central building blocks of Zambia's manufacturing sector, diversification into different products may be both necessary and advisable in order to broaden Zambia's export base and make it less sensitive to idiosyncratic global demand shocks. Together with the development of the medium and high-tech sectors (representing engineering products in the present analysis), Dinh (2013) notes that Zambia has not fully exploited its latent comparative advantage in resource-based light manufacturing industries. While the extractive sector is firmly linked to the Chinese and European market (particularly Switzerland as well as Italy through the import of flat-rolled stainless steel products), distance-sensitive products such as processed food and beverages sectors find better opportunities in regional markets (International Trade Centre, 2016). Chitonge and Kabinga (2019) stress the importance of the Zambian agro-processing sector because of its notable backward linkages with agriculture as well as the services sector.

BLOCK 3: IDENTIFICATION OF KEY BOTTLENECKS

This section of the report identifies the key bottlenecks that Zambian firms face, with a particular focus on formal manufacturing firms. The analysis is based on surveys conducted by the World Bank Group in their series of Enterprise Surveys, Innovation Surveys and Skill Surveys (further details on the databases are provided in Appendix E). It contributes to understanding the main issues that keep Zambia and its manufacturing sector from achieving the industrialization targets set by the development plans and relevant policies, in particular: the Vision 2030, the 7th National Development Plan as well as the National Industrial Policy.

Bottlenecks are defined as problems related to factors that have a negative impact on the performance of manufacturing firms and their ability to create value added and jobs. These include either direct inputs such as different forms of capital and labor, or indirect inputs such as the institutional framework. While the key strategic documents of Zambia list strategic objectives and intervention areas, the present analysis will make meaningful contributions to help substantiate and quantify the listed challenges as well as recommend priority focus areas. One key caveat that needs to be highlighted is that Zambian data from the databases date back to 2013 for parts of the World Bank Enterprise Survey, the entire World Bank Innovation Survey and 2016 for the World Bank Skills Survey. The results from the recently released World Bank Enterprise Survey 2019/2020 are included for the manufacturing sector as a whole to observe the overall trends over the last six to seven years. However, results for subgroups are not reported, as the number of manufacturing observations is significantly smaller than in 2013 resulting in reduced information. For completeness, they are included in Table 62, Appendix F.

The next section summarizes the findings on main obstacles in general, while the section following that provides details on the skill-related bottlenecks. In the third section we briefly discuss other selected bottlenecks. The bottlenecks emerging from the analysis have also been discussed with relevant stakeholders during consultations.

The sectorial classification adopted in this part of the study is consistent with Table 5 of Block 2 with the medium and high-tech aggregate (excluding fabricated metals and chemicals, i.e. 28M-) representing a proxy of engineering sectors. In the surveys there are only few or no data concerning the pharmaceutical sector that is not included in the analysis. Even though it is not a priority sector, findings about the chemical sector are discussed in the text to offer full information.

I. Main obstacles for manufacturing firms

Table 14 reports the share (%) of firms that stated topics as a very severe or major obstacles to their operation. It lists 16 topics that are covered in the different surveys. In 2013 the top obstacles were Competition practices of the informal sector (45%), Electricity (44%), Access to Finance (38%) and Access to Land (36%). In 2019 it was Electricity (65%), Access to Finance (40%) and Practices of the informal sector (29%) and Access to land (20%). This means, electricity increased in importance, Access to Finance remained unchanged, the Informal sector dropped but is still mentioned 3rd most often, while land improved significantly. By analyzing 2019 data, access to Land dropped to 20% and was therefore identified by a similar number of firms as corruption, tax administration and tax rates. However, comparing WBES 2013 and 2019 data of the non-manufacturing sector (Table 14 and Table 62), land does not drop to the same extent and remains the fourth most important bottleneck over time. This finding suggests that the large drop of land as one of the most recurrently cited bottlenecks to business for manufacturing firms may partially depend on the numerically more limited dataset in 2019. Electricity, access to finance, competition practices of the informal sector and land were named by a larger share of Zambian manufacturing firms than by average lower-middle-income (LMI) country manufacturing firms. Domestically owned firms seemed to face these obstacles significantly more strongly than foreign owned firms. SMEs and non-exporting firms felt the constraints stronger than large firms and exporters respectively. For electricity, the vulnerability of SMEs is expressed more in terms of monetary losses for power outage than in terms of perceived outages.

Other challenges identified that affected Zambian manufacturing companies more than firms in other lower middle-income countries in 2013 were crime, customs, telecommunications, transportation, and inadequate skilled labor force (discussed in detail in the next section). In 2019 it was business licensing, courts and, still, an inadequately skilled labor force.

Consultations with Zambian stakeholders are largely aligned with these results and their views are included below. They also reflected the changes over time, such as the increasing problem of electricity, the slightly increasing problem of taxes or the slightly decreasing severity of access to land or the informal sector. The following table describes the most important bottlenecks in detail.

Table 14 Share (%) of firms identifying each of the listed issues as very severe or major bottlenecks to business

	Mnf 2019 2013	Non-Mnf	Mnf. LMI	Proc. food	Textile Leather	Wood	Non-met. miner	Metals	Chem	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Export.	Non-exp
Access finance	40 38	29	19	29	47	42	35	34	32	37	42	25	18	41	26	41
Access to land	20 36	30	14	32	42	43	43	34	26	26	40	22	27	37	28	38
Business lic. and permits	15 13	12	13	10	7	16	17	17	16	NA	13	8	9	13	10	13
Corruption	21 33	19	44	26	31	21	44	29	30	29	35	28	21	35	24	36
Courts	17 10	10	10	8	7	5	11	10	8	4	9	9	9	9	11	9
Crime	7 14	13	11	15	14	16	32	19	6	8	15	8	6	15	8	16
Customs	11 15	9	12	12	12	5	17	14	22	30	13	23	21	15	32	12
Electricity	65 44	27	39	49	39	58	49	29	45	26	47	30	47	43	41	44
Inad. skilled labor force	13 17	10	12	17	21	11	30	19	12	15	18	12	21	17	18	17
Informal sector	29 45	46	18	37	68	68	41	44	39	26	48	36	33	46	31	49

Labor regulation	9 13	10	13	9	9	10	14	20	10	14	14	10	6	14	13	13
Political instability	18 13	8	28	7	18	5	22	9	12	11	13	10	9	13	8	14
Tax admin	18 9	7	18	17	4	5	5	10	14	4	10	8	3	10	13	9
Tax rates	21 17	17	29	22	14	5	14	17	20	23	16	20	18	17	28	14
Telecom.	NA 13	10	7	13	14	11	11	7	24	15	14	12	12	13	19	12
Transportation	12 22	13	14	21	14	16	22	15	28	14	24	15	18	22	19	23

Note: Share (%) of firms that stated listed topic as very severe or major obstacle.
Data Source: World Bank Enterprise Surveys. Zambia 2013 for all columns except LMI, Zambia 2019 added to col. 1 Mnf (manufacturing).

a) Electricity

A reliable power supply is an important input into many production processes of manufactured goods, more so if the manufacturing sector is to grow and diversify (Andersen & Dalgaard, 2013). Zambia relies very much on hydro power (approx. 85% of capacity) coming from the Kariba Dam. With a climate that gets hotter and demand increasing fast than supply, there are massive power shortages that affect households and firms alike. The mining sector consumes the majority of electricity in Zambia (68%), commerce and industry use only 4% but both are projected to increase their demand significantly (WWF, 2016).

In 2019, electricity was seen as a very severe or major challenge by 65 % of manufacturing firms (Table 14), which is 26 percentage points higher than average perceptions of other LMI country manufacturing firms. In 2013, wood processing (58%), food processing (and non-metallic minerals (both 49%) have had the most challenges with this, while producers of medium and high-tech sectors (excluding fabricated metals and chemical products) reported it the least (26%).

Table 15 Bottleneck: Electricity

	Mnf 2019 2013	Non-Mnf	Mnf. LMI	Proc. food	Textiles Leather	Wood	Non-met. minerals.	Metals	Chem.	MHT (28M-)	Dom. owned	For. owned	Large firms	SMEs	Export	Non-exp
Experience power outages (%)	86 82	78	70	87	77	68	89	71	94	85	83	81	79	83	84	82
Number power outages	15.6 7.1	5.7	40	7.5	7.1	9.1	8	4	7	7.9	7.5	5.7	11.3	6.7	5.2	7.5
Length power outages	7.2 3.6	2.3	4.2	3.2	5.7	2.8	2.9	2.7	2.7	4	3.8	2.9	5.2	3.4	4	3.5
Losses (% sales)	24.8 14.1	7.9	11.3	12.4	18.5	20.9	13.6	9.5	10.2	13.1	15.7	7.3	8.4	14.6	10.6	14.7
Cost (%) of electricity	6	7	5	8	6	6	9	5	7	8	6	6	3	7	6	7
% own or share generator	52 23	31	53	32	9	11	27	29	29	22	19	39	56	20	40	20
Share (%) of power electricity generator	29 14.5	20.7	20.7	12.5	21.8	27.5	20	6.3	15.6	13.4	14.4	14.9	17	13.8	18.1	13
Cost (%) of fuel	7	3	4	9	7	3	7	6	9	7	7	6	5	7	7	7

Note: The number of power outages is reported in average occurrences in a typical month, the length of power outages is reported in average hours per outage. The cost of electricity and fuel are reported as average shares (%) of total costs. Losses due to power outages are reported as average share (%) of total sales. Experience and 'own or share' refer to shares (%) of firms. *Data Source:* World Bank Enterprise Surveys. Zambia 2013 for all columns except LMI, Zambia 2019 added to col. 1 Mnf (manufacturing).

According to the enterprise survey (Table 15), 86% of all Zambian manufacturing firms experienced power outages in 2019, a slightly higher share than 2013. The monthly occurrences doubled from seven to 15, so did the length from 3.6 to 7.2 hours on average. Compared to other lower-middle-income countries (LMI), the outages are fewer but longer in Zambia. With as high as 94%, almost every single chemical producer was affected by power outages in 2013. Conform with Table 14, large firms were more affected by this than SMEs. In terms of losses this inflicts, textile and wood producers suffered up to 19% and 21% losses (in sales) respectively. Also, it is SMEs, domestically owned firms and non-exporters that suffer relatively higher losses due to a lack of electricity. In 2013, electricity made up only 6% of overall costs to firms but the interruptions to the production process seem to have been the larger concern. This is further highlighted as 30% of manufacturing firms responded in 2019 that electricity is the main reason for them to produce below capacity. For 29% it is the main obstacle to their expansion of sales.

Comparing the numbers to 2013, most metrics show an even higher severity of the problem in 2019. Getting electricity was also identified as a major challenge in the Ease of Doing Business rankings, as seen in Figure 23, Block 1, where Zambia ranks 129 out of 190 economies in 2019. This is also in line with the fact that households rated the outages of 2019 as worse than those in the years before (Maboshe M., 2020), stressing the urgency of the issue.

Different stakeholders agreed strongly that the lack of a stable power supply represents one of the top bottlenecks. They all reported of load shedding[37] that sometimes lasts half a day or more. Not only do power cuts decrease productivity of firms and some lay off workers or even shut down, but due to the unpredictable schedule of load shedding, there are additional problems. First, labor costs increased since workers had to work unusual hours (sometimes at night[38]). Second, some machines need a controlled shut down and sudden power shortages not only potentially damage these machines, but it is harder to continue production afterwards. Third, the use of diesel generators as a coping mechanism increased overall costs for firms, with some firms not able to afford a generator.[39] Table 15 shows that 52% (23% in 2013) of manufacturing firms used or shared a power generator. In 2013 so did a fifth of SMEs, half of large firms and 39% of foreign owned firms. In 2019, these generators were on average responsible for 29% of electricity used by manufacturing firms, a strong increase from 14.5% in 2013. Data analysis also shows that firms that report access to finance as a severe or major problem, show a lower probability of using generators. Further details on the results of a probability model are provided in Table 49, Appendix F.

The cost of fuel for the average manufacturing firm in 2013 was 7% of total costs, 9% for food producers and chemicals production and 3% for wood production. On average, cost of fuel surpassed the cost of electricity although part of fuel costs can be attributed to electricity generation as well.

[37] Load shedding is the intentional partial shut down of the power grid. In 2019, load shedding reached up to 16 hours a day (Haria & Ahmed, 2020).

[38] See also Sladoje (2016).

[39] See also Sladoje (2017).

An additional factor that makes electricity more expensive, is the fact that power was also imported from South Africa at higher costs (Sladoje, 2016). Despite these imports, the government now has implemented tariffs in order to incentivize domestic capacity building in electricity generation.

b) Water

Water is an important input in the production process of many sectors, and it must be managed sustainably as it influences many aspects of Zambian life. With continued global warming, water will become scarcer still which will also impact electricity generation in Zambia. It is not only about availability but also about hygiene which is important for citizens and tourists drinking[40] it, but also for some production processes, e.g. in the food sector. Of all water used in Zambia in a year, 73% is used by agriculture, 18% by households and 9% by industry (WWF, 2016).

According to the Enterprise Survey (Table 16), 15% of manufacturing firms at some point in 2018 experienced water shortages. In a typical month there were 14.5 incidents on average where water shortages influenced production. They lasted on average for 9.4 hours which means a third of the month firms had no water for their production. Over time, less firms reported water shortages but those who did, reported slightly more. When firms were affected in 2013, it was 18 hours for wood producers and a whole day for producers of medium and high-tech sectors (excluding fabricated metals and chemical products).

Table 16 Water shortages

	Mnf. 2019 2013	Non Mnf	Mnf LMI	Proc. food	Textile Leather	Wood	Non-met. minerals	Metals	Chem.	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo	Non-exp.
Experience (%) water shortages	15 24	33	7	42	16	32	32	10	27	11	25	19	27	24	24	24
Number of water shortages	14.5 10.2	6.5	32.7	9	9	10.8	16.9	3	13	10.3	10.7	7	8.4	10.4	9.6	10.3
Length of water shortages	9.4 10.9	2	10.9	6.9	6.2	18.2	6.2	14	16.2	24	10.8	11.2	9.9	11	11.2	10.8

Note: Share (%) of firms that experienced water shortages, average number of occurrences in a typical month and average length (in hours).
Data Source: World Bank Enterprise Surveys. Zambia 2013 for all columns except LMI, Zambia 2019 added to col. 1 Mnf (manufacturing).

c) Access to finance[41]

Zambian firms need capital to finance their investments, irrespective of the firm size or specific products produced. According to the Enterprise Survey 2013, 38% of Zambian manufacturing firms report that access to finance is a key constraint. This is almost 10 percentage points higher than for non-manufacturing sectors and almost 20 percentage points higher than manufacturing sectors in lower middle-income countries on average. In general manufacturing firms find it more difficult to obtain loans than other types of firms. This is because they usually require large sums of capital for investment with longer repayment periods. Access to finance was the largest obstacle for the medium and high-tech sectors (excluding fabricated metals and chemical products), the second largest obstacle for the textiles and metallic sectors and the third largest for the woods and chemicals sectors. Table 14 shows that it was

[40] 60-70 percent of water consumed in Zambia is groundwater (Thomson Reuters Foundation, 2018).
[41] Most questions on finance are only included in the Zambian Enterprise Survey 2013.

a significantly larger challenge for domestic firms (42%), SMEs (41%) and non-exporters (41%), while it was much less of an issue for foreign-owned firms (25%), exporters (26%) and particularly large firms (18%).

The average Zambian manufacturing firm applied for one to two loans or lines of credit in 2011 and roughly every second application from manufacturing firms was rejected. 66% of applications from textile firms were unsuccessful and 100% of the applications from wood producers. This is in line with the two sectors stating access to finance was a severe or major challenge. Producers of medium and high-tech sectors (excluding fabricated metals and chemical products) faced the lowest rejection rate with every 7th application rejected on average. The main reason for the high rejection rate is the lack of collateral (40% of rejections), followed by insufficient profitability (13%).

Table 17 Bottleneck: Access to Finance

	Mnf	Non Mnf	Proc. food	Textile Leather	Wood	Non-met. minerals	Chem.	Metals	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
Nr. application	1.40	1.07	0.86	2.00	2.00	1.25	1.56	1.42	1.00	1.41	1.33	1.00	1.45	1.11	1.45
Rejected application	0.48	0.20	0.17	1.33	2.00	0.50	0.44	0.25	0.00	0.51	0.33	0.00	0.55	0.22	0.54

Note: Average number of financial applications and average number of rejected financial applications.
Data Source: World Bank Enterprise Survey Zambia 2013.

A third of SMEs' applications were rejected. A study that surveyed SMEs and their relationship to Financial Service Providers (FSD Zambia, 2017) shows the following views of SMEs: Banks take (too) long to provide answers on financial applications and they lend almost exclusively to applicants with the necessary collateral. SMEs perceive bank officials as having a 'conservative approach in terms of their ideal client profile, sector, or prevailing business model' and as not understanding the SME business. Female SME owners do not perceive to be treated fairly and there is a tendency of very small businesses not wanting to be involved with banks in general. Last, SME owners did not think banks really adapt their offers to the SMEs' needs.

Table 18 reports reasons why firms did not apply for loans in 2012. Half of manufacturing firms did not need a loan. The remaining firms reported high interest rates, high collateral requirements and complicated processes as reasons which reinforces the above.

Table 18 Access to finance - Reasons for not applying

	Mnf	Non Mnf	Proc. food	Textile Leather	Wood	Non-met. minerals	Metals	Chem.	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
No need for a loan	46	54	45	41	35	63	58	44	52	40	69	72	43	58	43
Application procedures were complex	10	6	12	13	6	7	8	5	13	12	5	4	11	10	10
Interest rates were not favorable	16	14	24	18	18	7	15	15	13	19	5	8	16	10	17
Collateral requirements were too high	12	10	12	13	18	10	8	5	9	14	3	NA	13	04	13
Size of loan and maturity insufficient	2	1	NA	NA	NA	NA	NA	3	NA	2	NA	NA	2	2	2
Did not think it would be approved	2	4	NA	3	06	3	NA	NA	NA	3	NA	NA	2	NA	2
	12	7	8	10	18	10	12	28	9	10	19	16	12	15	12

Other															

Note: Share (%) of firms that responded why they did not apply for a loan in 2012.
Data Source: World Bank Enterprise Survey Zambia 2013.

This information is in stark contrast to the high-ranking Zambia received for the indicator "Getting credit" of the Ease of Doing Business ranking in 2019 (4th place). This deserves a clarification: The Ease of Doing Business indicator combines the scores of the legal rights index and the credit information index, which gives an indication on the regulations in place for the purpose of getting credit. Since the early 2000's Zambia has undergone numerous regulatory reforms to improving the banking and loans system, however the difficulty in meeting the requirements for collateral and the high interest rates make loans more accessible for larger firms while largely excluding SMEs.[42] The information gathered from the Enterprise Survey presents firm's experiences and perceptions and provides some information on "actual" access to finance.

Consultations confirm the importance of access to finance as top priority. A lack of access to finance was mentioned by every single interview partner. They argued that it is mostly about affordability. Box 3 discusses details on interest rates, banks and the macroeconomic environment. However, it is not only about high interest rates and high collateral requirements[43], but also about financial knowledge of entrepreneurs that sometimes acts as a barrier to sufficient financing.[44] Skills such as developing a sound business plan are also needed to apply successfully for loans.

Box 3: Interest rates and credit

Interest rates are a main driver of costs for finance. The amount of interest charged by banks to firms reflect different aspect. First, the official policy rate set by the central bank determines the overall level of interest in a country and banks usually move parallel to this overall level. From 2013 to 2016 the policy rate increased from 9% to 15% before declining again in 2017 (Figure 24).

Figure 24 Policy interest rate, Zambia (2013-2020)

Data Source: Bank of Zambia

[42] Source: https://www.inclusivebusiness.net/ib-voices/access-finance-inclusive-businesses-zambia. Accessed 24.04.2020; Martínez, 2006.
[43] There are new programmes that make it possible for firms to use movable assets as collateral.
[44] There is already a second National Strategy on Financial Education for Zambia that aims at having a 'financially educated Zambian population by 2030' aligned with the Vision 2030 (Ministry of Finance, 2019).

This is in line with the inflation rate that first increased and then decreased again. The mark-up on the policy rate that banks charge reflects the profit margin as well as the risk assessment of the creditor or their specific project. In 2013, manufacturing firms, on average had to pay 18.2% interest on their most recent credit and 16% on their most recent overdraft facility (*Table* 48, Appendix F). This is significantly higher than the policy rate. The textile and leather sectors paid 35% for their most recent credit. Medium and high-tech sectors (excluding fabricated metals and chemical products) as well as large firms, foreign owned firms and exporters were charged lower interest rates (still 14% to 16%) than their respective Zambian counterparts. Most loans to industry are provided by large banks and they react faster and stronger to monetary policy as well as exchange rate fluctuations than smaller banks (Simpasa, Nandwa, & Nabassaga, 2015). Zambian banks also show a high concentration in their lending behavior (Simpasa & Pla, 2016). While this enables them to better monitor their risk, we would assume that they are also more dependent on and thus vulnerable to the performance of the chosen industries. This, however, does not seem to be the case and might additionally explain the lack of better access to finance. Based on surveys in 2018, Zambian banks and other smaller lenders reported relatively slow regional economic growth, a weakening Kwacha and credit risk among their main concerns (PWC, 2019). Non-performing loans are a driving force for banks to increase their interest rates. The average lending rates were 27% in 2017 and 24% in 2018.

The level of formal financial inclusion of adults was 38% in 2015 (World Bank Group, 2017). Zambia's government realized the need for access to finance for both individuals and firms by developing a National Financial Inclusion Strategy starting 2017. It is driven by the vision 'to achieve universal access and usage of a broad range of quality and affordable financial services that meet the needs of both individuals and enterprises (Ministry of Finance, 2017). For SMEs and the agricultural sector, it lists measures such as the ability for firms to use movable assets as collateral, training lenders to react to specific needs of SMEs, review existing government schemes or finance agricultural value chains.

d) Practices of the informal sector

In 2014, about 84% of the population were employed in the informal sector and the majority of informal activity is in the rural setting. While the majority of informal businesses is small, some urban firms are comparable in size, skills, etc. to their formal counterparts (Shah M., 2012). In Lusaka, 41% of informal firms are manufacturing firms. In some cases, they are not smaller than registered firms and even growing. Most employees work full-time and receive wages on a regular basis (Konde & Tang, 2018). The main advantages for informal firms are lower labor costs, lower or no taxes and a lower bureaucratic burden in general. There is also anecdotal evidence of illicit trade (food and beverages) which makes it harder for formal firms to compete.

According to the Enterprise Survey 2013 (Table 14) 45% of all manufacturing firms (in the formal sector) stated that this is a severe or major obstacle for them. The sectors that reported this most were the textiles and wood processing sectors (both 68%). All sectors apart from the medium and high-tech sectors (excluding fabricated metals and chemical products) reported the practices of the informal sector as one of the top three challenges. It affected somewhat more domestic firms, SMEs, and non-exporters. This is in stark contrast to the average of LMI countries, where 18% of manufacturing sectors reported this to be a large obstacle. There is, however, a positive trend in that the share of manufacturing firms that stated the practices of the informal sector as a severe or major bottleneck dropped to 29% in 2019 (Table 14).

Consultations have shown that competition from the informal sector, on one hand, may be severe due its overall size, on the other hand, informal firms are small and usually only conduct 'backyard' manufacturing. Consultations have also highlighted the wish of many informal firms to register if the conditions are adequate. Konde and Tang show that a small share (max. 7%) of informal firms is registered with at least one official agency for specific services. Asked about reasons for not registering their businesses, firms responded with (i) high registration fees, (ii) increased business cost, (iii) lacking knowledge how to register, (iv) peers are also not registered and (v) that they don't see benefits from registering (2018). The recently released 2019 Zambia World Bank Survey of informal firms, additionally shows reasons firms named for not registering. Of firms that manufacture goods, 43% named time, fees and paper work as well as a lack of information on how and where to register. 33% named taxes or the fact that they do not see a benefit from registering their firm.

However, formal firms are more productive and, on average, can create higher returns. Better educated labor seems to self-select into the formal economy. What is more, the vast majority of firms that have access to finance are formally registered firms (Shah M., 2012).

e) Access to land

Since independence, Zambia has seen many reforms, but land politics are still a highly debated issue between different stakeholders, such as investors, the government, and chiefs (traditional leaders). There are two types of land in Zambia, state land managed by the government and customary land managed by local communities.[45] Land in Zambia is not owned but leased and leasehold is up to 99 years. Up to 94% of Zambia's land is under the legal authority of its chiefs. Access to land is a particular challenge for women as 'most of the cultural norms and practices in Zambian society rarely support the view that women should acquire and control land in their own right' (Vision 2030, p.23). The government acknowledges the importance of land as a critical factor of production and a more effective land administration as necessary for further development (7NDP, 2017). The most recent draft of a National Land Policy was created in 2018 and is still under discussion.

20% of manufacturing firms (36% in 2013) flag Access to Land as a very severe or major obstacle. Although this value is still higher than that reported by the average of lower middle-income countries, it improved significantly. Sectors it affected most in 2013 were wood, textiles and non-metallic minerals. Domestically owned firms, SMEs and non-exporters also reported this bottleneck relatively more often.

According to the Ease of Doing Business ranking, Zambia holds 67th place in dealing with construction permits out of 190 economies. 20% of manufacturing firms applied for a construction permit in 2018 (further details are provided in Table 56, Appendix F). The number of days until permits were granted varied widely with 30.6 days for the average manufacturing firm (55.5 days in 2013. In the World Bank's 'Ease of Doing Business' index, Zambia ranks 149th (out of 187) in 'registering property', it counts on average 6 procedures to complete the registration and an average duration of 45 days. The World Economic Forum's Competitiveness Index ranks Zambia's 'quality of land administration' 124th out of 141 (Schwab, 2019).

[45] There is also a third de-facto tenure consisting mostly of urban areas such as Lusaka where a considerable share of people live informally.

In total, manufacturing firms hold around 1.5% of land in Zambia (Mulolwa, 2016). Land can also be an important collateral to get financing. We find that firms that view Access to Finance as a very severe or major obstacle also report Access to Land to be an obstacle (and vice versa) with a higher probability (further details are provided in Table 50, Appendix F).

Consultations have highlighted the importance of a lack of access to land as major problem but also recognized that improvements have been made, reflecting the survey results. Progress has been made with respect to the speed and transparency of application processes. Also, firms often are in multi-facility economic zones where access to land is not an issue. However, as land in general is leased, some stakeholders mentioned a lack of certainty and security as land theoretically could be repossessed. Anecdotal evidence from consultations showed that the system allowed fraudulent sellers to sell a property more than once simultaneously. Better and easier access to land would also presumably lead more informal firms to register.

The Land Governance Assessment Zambia Country Report (Mulolwa, 2016) shows that there are many institutions that deal with land matters and that this creates coordination problems and even legal uncertainty and long legal processes. One example is the non-existence of a single land register but multiple registers that can lead to uncertainty. Another topic mentioned is the sometimes complicated and expensive (5% of property value) procedure to record property transfers and ensuring the right person or firm is recorded as leaseholder. This can also make it more difficult to attract FDI into Zambia as it decreases their ability to draw on local or national authorities to enforce their rights.

II. Skills-related bottlenecks for the manufacturing sector

The importance of a skilled workforce has been discussed in Block 1. Skills are a crucial input in every production process and often acts as a driver of innovation and growth and developing the adequate skills for industrialization is a priority for the country. This section takes a closer look at the existing education levels and skills of the Zambian labor force that is employed by the manufacturing sector. The section also identifies bottlenecks related to the hiring process and labor force training. The analysis is based on the World Bank Skill Survey for Zambia (2016) as well as the Enterprise and Innovation Surveys.[46] Additionally, the views of stakeholders are represented below.

a) Skills and job composition

Data on the level of education of the workforce (provided by the Skills Survey) specific to manufacturing sector provides a very similar picture the that found for the labor force as a whole (see Figure 16 in Block 1). Almost half (49%) of the workforce in manufacturing have either completed tertiary (29%) or upper secondary (20%) education. 40% of workers in foreign owned firms have tertiary education. Out of the different manufacturing subsectors, textiles has the largest share of the same (38%) as well as a somewhat

[46] As detailed in Appendix E3, there is only one comparable Skill Survey conducted in Tanzania (2015). Although Tanzania is a low-income country compared to the lower-middle-income status of Zambia, there might be value in comparing the two. It is shown in the tables by the 'TNZ' column. Additionally, the Skill Survey, contrary to the Enterprise and Innovation Survey, does not cover sectors woods, chemicals, non-metallic minerals or medium and high-tech sectors (excluding fabricated metals and chemical products).

higher share of both tertiary and upper secondary graduates (53%) compared to the other manufacturing sectors (roughly 47%). Further details are provided in Table 57, Appendix F. The overall distribution of job types is homogenous across different sectors and dimensions.

Moreover, labor costs in Zambia seem to be a burden on manufacturing firms. On average, 40% of total costs are labor costs compared to the average of 23% in lower middle-income countries. The firms with the lowest shares are large firms, where labor costs make up 32% of total costs (further details are provided in Table 60, Appendix F). The high labor costs may to some extent be associated with the fact that labor productivity increased significantly over the years and by 2017 overtook LMI average, as seen in Figure 5, Block 1.

b) Skills-related problems

Despite relatively high levels of formal education, the factual lack of skills in manufacturing is still an issue, which is in line with the findings from the Enterprise Survey of 2013 and 2019. The extent to which this hinders firm's performance depends largely on the sector. 30% of firms in the non-metallic minerals sector, 19% in metals sector and 15% of producers of medium and high-tech sectors (excluding fabricated metals and chemical products) – which generally requires more technical and higher levels of skills – indicated that the missing skills created a very severe or major problem (Table 14).

Table 19 reports which skills of workers are perceived by firms to be below the required level. IT skills are named most often by all types of firms.[47] On average, a quarter of manufacturing sector respondents stated that this is below average in their firm. This is followed by English (18%) and technical (vocational) skills (16%), although in the metals sector, insufficient vocational skills (18%) are the larger challenge among the two. English was not fully confirmed as a key country`s skill bottleneck to business during consultations and reflects a share much lower than the Tanzania firms` survey. Technical and vocational skills are also among the top three priorities when hiring.

Table 19 Skills below requirement

	Mnf	Non Mnf	Mnf TNZ	Proc. food	Textiles Leather	Metals	Dom. owned	SMEs	Non-exp.
Critical thinking	7	8	5	6	19	7	7	7	6
English	18	14	60	12	33	11	18	19	18
Interpersonal	12	9	5	8	19	14	11	13	13
IT	25	19	56	22	38	21	25	28	26
Numerical	11	11	NA	14	14	4	10	12	12
Problem solving	7	7	11	2	10	11	7	8	7
Vocational	16	12	19	16	14	18	17	19	18
Work Ethic	5	6	5	2	10	11	5	5	5
Writing	12	09	13	6	19	11	12	14	13

Note: Share (%) of firms indicating a skill level of their workforce as 'below required'. There are too few observations for foreign owned firms, large firms and exporting firms.

[47] According to the World Economic Forum's Global Competitiveness Report 2019, Zambia ranks 118th out of 141 in terms of 'digital skills among active population' (Schwab, 2019).

Data Source: World Bank Skill Survey Zambia 2016 and Tanzania 2015.

Table 20 presents the main challenges that manufacturers face due to the lack of skills. More than a third of manufacturing firms report problems such as developing new products, implementing new technology or maintaining the required quantity or quality of their production. It is evident here again that the metal sector seems particularly affected by the lack of skills, with generally higher shares of firms reporting a certain skills-related problem. More than half of firms in the metal sector reported that the lack of labor or skills lead to challenges in maintaining production levels according to demand. Large firms seem less affected than SMEs and exporters less than non-exporters.[48]

Table 20 Performance problems due to labour shortages or skill gaps

	Mnf	Non Mnf	Mnf TNZ	Proc. food	Textiles Leather	Metals	Dom. owned	Foreign owned	Large firms	SMEs	Exp.	Non exp.
Developing new products	35	19	26	35	38	36	34	67	19	37	08	38
Implementing new technology or improving production processes	35	29	21	29	29	39	35	33	31	35	25	36
Maintaining consistent quality	33	23	21	29	29	46	33	67	25	35	17	35
Maintaining production levels according to demand (or planned output)	36	21	22	27	29	54	35	67	31	36	33	36
Effective sales and marketing	38	32	25	33	48	46	38	33	19	41	42	38

Note: Share (%) of firms reporting problems due to labor shortages or skill gaps.
Data Source: World Bank Skill Survey Zambia 2016 and Tanzania 2015.

c) Skills development for staff

To acquire the necessary skills, a firm can either opt to train its staff or hire new workers. Of all manufacturing firms, 28% offer some form of formal training to their staff. The Innovation Survey shows that 25% of manufacturing firms conducted training specifically for the development and/or introduction of innovative products/services and processes.[49]

On average, 50% of staff participate in training, although this figure drops to 38% for the metal sector. In-house training is mostly provided by own staff and outside training by industry associations. The main reasons why firms do not use training in any form is reported in Table 21. For 42% of the firms, training would be too expensive (or not cost effective), 34% indicated that training would not be useful. This would be a potential area for intervention and there are already examples of UNIDO working with Zambian manufacturing in this regard (e.g. the ZAMITA initiative (UNIDO, 2014)).

[48] There are few observations for some sub-groups.
[49] Zambia ranks 109th out of 141 in 'extent of staff training' in the World Economic Forum's Global Competitiveness Report (Schwab, 2019).

Table 21 Reasons for not conducting trainings

	Mnf	Non-Mnf	Mnf TNZ	Proc. food	Textiles Leather	Metals	Dom. owned	Foreign owned	Large firms	SMEs	Export.	Non-exp.
Cannot afford for my staff not to work while taking the training	10	12	12	11	5	7	9	33	6	10	NA	11
If training provided, workers will leave for other firms	11	13	11	11	5	18	10	33	12	10	9	11
Too expensive/ not cost efficient	42	36	40	45	55	29	42	33	44	42	27	43
Training programs/trainers were not available	4	3	12	4	NA	4	4	NA	NA	5	NA	5
Training would not be useful	34	35	17	30	35	43	34	NA	38	33	64	31

Note: Share (%) of firms naming main reasons for not conducting formal training.
Data Source: World Bank Skills Survey Zambia 2016 and Tanzania 2015.

d) Hiring

When manufacturing firms hire new workers, the most important skills sought are soft skills such as interpersonal and communication skills as well as work ethics (34%), this is followed by technical skills other than computers/ vocational, job specific skills (20%).[50] The latter was 33% in the textile and 29% in metal sector. Innovative and export-oriented firms generally demand more skilled workers with tertiary education, TVET credentials and higher occupational skills (Cao & Saeki, 2018).

When asked what type of vacancy positions have not been filled, technicians and associate professionals is the highest category, with almost half of the positions left vacant (46%). In second place is the 29% of vacancies for clerical support worker positions that were not filled, while for managers the share was relatively low at 18%. For plant and machine operators and assemblers – commonly seen as low-skilled jobs – 16% of the vacancies have not been filled. Note, however, that Table 22 is based a very few observations.

This information confirms Zambia's scores from the Global Talent Competitiveness Index, where the largest challenges for the country were related to technology utilization and lack of technicians and associate professionals.

Table 22 Share of vacancies not filled

	Manufacturing	Non-Manufacturing	Manufacturing Tanzania
Clerical Support workers	29	22	8
Plant and machine operators and assemblers	16	24	15
Managers	18	28	0
Others	11	23	13
Professionals	21	14	23
Service and sales workers	11	18	29
Technicians and Associate Professionals	46	12	26

[50] Further details are provided in Table 58, Appendix F. Also, according to the World Economic Forum's Global Competitiveness Report 2019, Zambia ranks 118th out of 141 in 'quality of vocational training' and 96th in 'skillset of graduates'. On the other hand, it ranks 30th in 'ease of finding skilled employees' and 24th in 'ease of hiring foreign labour' (Schwab, 2019).

Note: Share (%) of vacancies not filled. The table only shows aggregate values as number of observations is very low for manufacturing. In manufacturing based on vacancies for: 9 managers, 14 professionals, 9 Technicians, 16 clerical support, 19 service and sales, 16 plant and machine operators and 12 others. This means for example that 4 out of 9 technicians were not hired.
Data Source: World Bank Skill Survey Zambia 2016 and Tanzania 2015.

Firms also hired specifically for the purpose of innovation. Table 23 shows that a third of firms hired staff for product or process innovation.

Table 23 Hiring for innovation

	Mnf	Non Mnf	Mnf LMI	Proc. food	Textiles Leather	Wood	Non-met. minerals	Chem.	Metals	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
Hired for product innov.	28	25	42	32	38	25	47	18	19	22	28	31	27	29	33	27
Hired for process innov.	35	32	43	34	44	50	42	15	32	33	35	39	38	35	34	36

Note: Share of firms that hired labor for product or process innovation.
Data Source: World Bank Innovation Survey Zambia 2013 (except column LMI).

Regarding the problems firms face when hiring (Table 24), a third of all manufacturing firms reported a lack of skills and this was the reason for 56% of firms in the metal sector,[51] indicating a large gap in supply of such skills in the labor market. The share was significantly lower in food processing and textiles, although still reported by a quarter of the firms. Almost every other manufacturing firm indicated that too high wage expectations was a problem when hiring, which is consistent with the information found earlier, that wages take up roughly 40% of total costs of a firm (Table 60, Appendix F).

Table 24 Problems when hiring

	Mnf	Non Mnf	Mnf TNZ	Proc. food	Textiles Leather	Metals	Dom. owned	Exporters	Non-exp.
Wage expectations too high	46	48	48	38	50	56	45	40	47
Lack of skills	34	35	45	24	25	56	32	40	33
Too few or no applicants	22	14	28	14	25	22	20	20	22
Appl. did not like working conditions	22	22	15	10	50	33	20	20	22

Note: Share (%) of firms reporting problems when hiring. Too few observations for foreign owned firms or to differentiate between firm size.
Data Source: WB Skill Survey Zambia 2016 and Tanzania 2015.

Another potential indicator pointing to a lack of skills is the share of foreign workers in the labor force. Half of manufacturing managers and technicians are foreign workers.[52] As the Global Talent Competitiveness Index revealed, Zambia has a very conducive environment to attracting workers from abroad. This fills the skills gap to a certain extent and disguises the challenges the country has in terms of having the (local) skilled workforce required for long-term competitiveness and industrialization.

[51] The fact that the metal sector could increase its performance with a better access to technology and the corresponding skilled workforce is also highlighted in Dinh (2013).
[52] Compare also UNIDO (2014).

Complementary insights about skills from Consultations

Consultations highlighted the skill mismatch between what industry requires and what employees can offer despite their (high level of) formal education. They repeatedly mentioned the same group of skill: technical, vocational on-the-job skills, IT skills and skills related to STEM (science, technology, engineering and mathematics). In part, these are skills required for medium and high-tech sectors, but some are required by all industries. Many interview partners mentioned funds or programs that want to help bridge this gap.

As mining activities are pivotal for Zambia, many initiatives are focused on this sector. Together with the fact that wages are generally higher in mining, this might create a relative scarcity of skills for other important sectors as skilled workers might chose to work in mining (UNIDO, 2014).

Interview partners also pointed out that many employees in informal firms have great artisan skills that are less required by (larger) manufacturing firms, making it harder to transfer people to formal employment.[53]

A second block of skills mentioned often are entrepreneurial and management skills. This is particularly important in connection with finance. The probability of successfully applying for credit is higher when owner/managers can create credible business plans for example.

III. A zoom on other relevant bottlenecks

The top bottlenecks that were named most often in the enterprise surveys remained unchanged and are discussed above. However, this section briefly discusses other topics that were either already named in this report, mentioned in consultations, or that have increased in significance over time.

a) Tax rates and administration

Tax rates are an important politically controlled economic variable influencing economic activity. Asked about tax rates and tax administration, Zambian firms seem to view it as a very severe or major obstacle that increased over time, from 9% of manufacturing firms stating this in 2013 to 18% in 2019 (Table 14). In 2013, medium-high tech sectors (excluding fabricated metals and chemical products) as well as exporting firms reported tax rates as a problem more than other sectors or firms.

Tax rates do not only affect the local economy but represent an important signal to international investors. Maboshe & Zulu (2018) flag the heterogeneous fiscal treatment of different sectors in the economy. Investment incentives were created to reduce the level of taxes for business. While the overall tax burden seems to have been decreasing, there are many sector-specific exceptions and individually negotiated incentives, which may create market distortions.

[53] Additionally, many graduates from the different state-funded programs enter the informal workforce, see e.g. Dinh (2013).

Maboshe & Zulu (2018) report Zambian manufacturing firms to be concerned about delays in VAT processing and duty drawback refunds as well as the scrapping of a 5-year tax holiday.

While the level of taxes and the patchwork of exemptions are one possible problem, taxes that were introduced relatively unexpectedly were named as a problem in consultations. In the newly released 2019 Enterprise Survey, 29% of manufacturing firms named taxation as the main rule or regulation that was enacted without prior notice or consultation affecting firms negatively.[54]

b) Customs and trade

11% of firms viewed customs as very severe or major obstacle to their operation in 2019 (15% in 2013). Zambian manufacturing export goods spent on average 11 days in customs (10 days in 2013)– almost double the 6 days on average for other lower middle-income countries. In addition, roughly 12% of goods were stolen and 7.5% were broken while in transit in 2013. These findings add significant burden to export procedures which hamper activity and impacts on achieving export-led strategy of the country.

On the import side, it took material and supplies 17.5 days (13.5 days in 2013) from the border to arrive at the importing manufacturing firm compared to 9 days in LMI. Import licenses took 8 days to be granted compared to over 20 days in 2013, a significant improvement. 23% of material inputs and supplies were sourced from abroad (26% in 2013) with the share being 55% (also in 2013) and 34% (46% in 2013) in the chemicals and medium and high-tech sectors (excluding fabricated metals and chemical products). Foreign owned firms sourced 35% (42% in 2013), large firms sourced 27% (41% in 2013) and exporters sourced 31% (41%) from abroad. This means, on average, materials were more sourced from within Zambia than from abroad over time. The Doing Business report 2020 suggests that regulations and reforms for trading across borders was the largest bottleneck for the private sector, placing the country at rank 155 out of 190.

c) Innovation, Digitalization and R&D

The growth and competitiveness of firms, sectors, and entire countries often depends on innovation as a main driver. If a firm does not innovate, it will have greater difficulties competing on the domestic as well as the international market.[55] More than half of manufacturing firms reported to have at least one major innovation in their products/services, their production methods or their logistics (Table 25). However, when it comes to in-house or external research and development (R&D), numbers decrease to 20% and 9%, respectively. 39% of average manufacturing firms in other LMI countries conducted in-house R&D, which is double that of Zambian firms. Large firms and exporters innovated more than SMEs and non-exporting firms.

Table 25 Share of innovators, R&D

	Mnf	Non Mnf	Mnf LMI	Proc. food	Textiles Leather	Wood	Non-met. minerals	Chem.	Metals	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
Products and services	61	60	55	46	64	60	48	60	53	59	62	60	73	60	65	60

[54] It has to be stressed that this question was only answered by 47 manufacturing firms.

[55] Zambia has a lot of room for improvement as it is ranked 115th out of 141 countries in 'innovation capabilities' according to the Global Competitiveness Index (Schwab, 2019). This is also discussed in Block 1.

Methods in production	64	55	50	56	70	73	48	53	63	82	63	67	82	62	74	62
Logistics	55	51	39	51	52	60	52	60	50	59	55	56	91	52	67	53
Conducted int. R&D	20	17	39	12	12	13	10	40	27	6	20	21	41	19	33	18
Conducted ext. R&D	9	9	8	5	6	7	6	20	3	12	9	6	9	9	7	9

Note: Share (%) of firms that innovated and conducted R&D.
Data Source: World Bank Innovation Survey Zambia 2013 (except column LMI).

Asked about the reasons for their innovation activities, firms overwhelmingly reported (i) extending their product range, (ii) accessing new markets, (iii) increasing speed and quality of production. 27% and 49% of manufacturing firms also innovated products and processes respectively to comply with regulations or standards (further details are provided in Table 51 and

Table 52, Appendix F. 88% of manufacturing firm also reported that their innovation intends to automate manual processes partially or fully (Table 53, Appendix F). In spite of that, more of these firms reported they increased their skilled and unskilled staff as consequence of their latest innovation than firms that reported a decrease in their skilled and unskilled staff as a consequence of their latest innovation. Most innovation ideas (Table 55, Appendix F) came from customer and supplier feedback as well as existing products on the market and over three quarters of firms developed their product or process innovation entirely in-house (Table 54, Appendix F). 40% of manufacturing firms cooperated with other domestic firms when developing a new product or service, 14% with consultants. Every other manufacturing firm reported that they funded innovation activities by themselves. Only a fraction funded it with the help of banks, the government or NGOs and international organizations.

The share of employees that regularly uses the computer in their job and the share of firms having an internet connection are reported in Table 26. Zambian averages are comparable to the average LMI country firm. It seems that more employees of medium and high-tech sectors (excluding fabricated metals and chemical products) regularly use the computer, as do employees of foreign owned firms, large firms and exporters. It is one more indication of the importance of technology in particular sectors. Almost 60% of Zambian manufacturing firms have access to the internet, which is below the LMI average of 78%.[56] Almost every large firm has internet but only half of SMEs. Exporters and foreign owned firms are more connected to the internet than non-exporters and domestically owned firms.

Table 26 Computers and internet access.

	Mnf	Non Mnf	Mnf LMI	Proc. food	Textiles Leather	Wood	Non-met. minerals	Metals	Chem	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
Use comp.	20	21	18	15	11	14	14	26	25	29	18	31	26	20	26	19
Internet connection	59	45	78	61	36	40	48	73	80	82	54	77	95	56	77	55

Note: Average share (%) of employees regularly using the computer in their job and share (%) of firms having an internet connection.
Data Source: World Bank Innovation Survey Zambia 2013 (except column LMI).

[56] According to the World Economic Forum's Global Competitiveness Report 2019, Zambia ranks 134th out of 141 in the use of internet by adults (Schwab, 2019).

d) Corruption

Block 1 already discussed the importance of the topic and the potential of corruption to disrupt economic processes. The Enterprise Survey shows that corruption was named as a severe or major bottleneck by 33% of manufacturing firms in 2013 and by 21% in 2019 but remains among the top five most mentioned bottlenecks among manufacturing firms.

SUMMARY OF BLOCK 3 AND IMPLICATIONS FOR PCP PROJECT DESIGN

Zambian firms face a series of obstacles which make it harder for them to operate and grow. This in turn, limits the potential of achieving the country's socio-economic objectives. The identification of key bottlenecks can be useful to orient the discussion about the design of future projects concerning inclusive and sustainable industrial development in the country. Whereas the country faces many challenges in terms of bottlenecks to business, the identification of the ones most recurrently perceived as obstacles to business can be useful to devote a special attention to these priorities within a context of limited time and resources.

The topics named most often as severe or major obstacles by manufacturing firms in 2013 were (i) the competition practices of the informal sector, (ii) the lack of a stable power supply, which creates losses in production and sales (iii) the lack of access to finance mainly due to high costs and collateral requirements and (iv) the lack of, or complications with, access to land. In 2019, it was still (i) electricity with an increase in importance, (ii) finance (stayed the same), (iii) the informal sector which improved and (iv) land which improved as well. These seem to be more severe obstacles for Zambian manufacturing firms than for manufacturing firms in lower middle-income countries. In addition, corruption, taxes and problems with customs were reported as serious challenges. On average, small and medium firms, domestically owned firms as well as non-exporters are more affected by most bottlenecks than their larger, foreign, exporting counterparts. Consultations have revealed that access to finance and the power supply are the most severe recent topics from the viewpoint of different stakeholders. In addition to projects related to energy (as discussed above), it is recommended to prioritize activities which support the government and meso level institutions in reducing such burdens to the extent possible. At firm level, support can be provided to firms by helping minimize the impact of these bottlenecks on their operations (through better access to information, as one example). A striking result is the consistency of problems over time. Both Enterprise Surveys (2013 and 2019) highlight the same topics as main bottlenecks but with some improving while others emerge as more pressing.

In terms of skills, the analysis has shown that although the level of education of workers in the manufacturing sector are generally good when compared to other lower middle-income countries, inadequate skills still remains a challenge. The extent varies largely across manufacturing sectors, with roughly every fourth manufacturer in the metal sector stating this is a severe or major challenge. In the food processing and textiles sectors, which are generally less technology and skills intensive sectors, significantly fewer respondents stated the same.

The type of skills that firms identified most often as problematic and below required are IT and technical/vocational. Despite the need to improve skills, half of the firms do not provide training for their

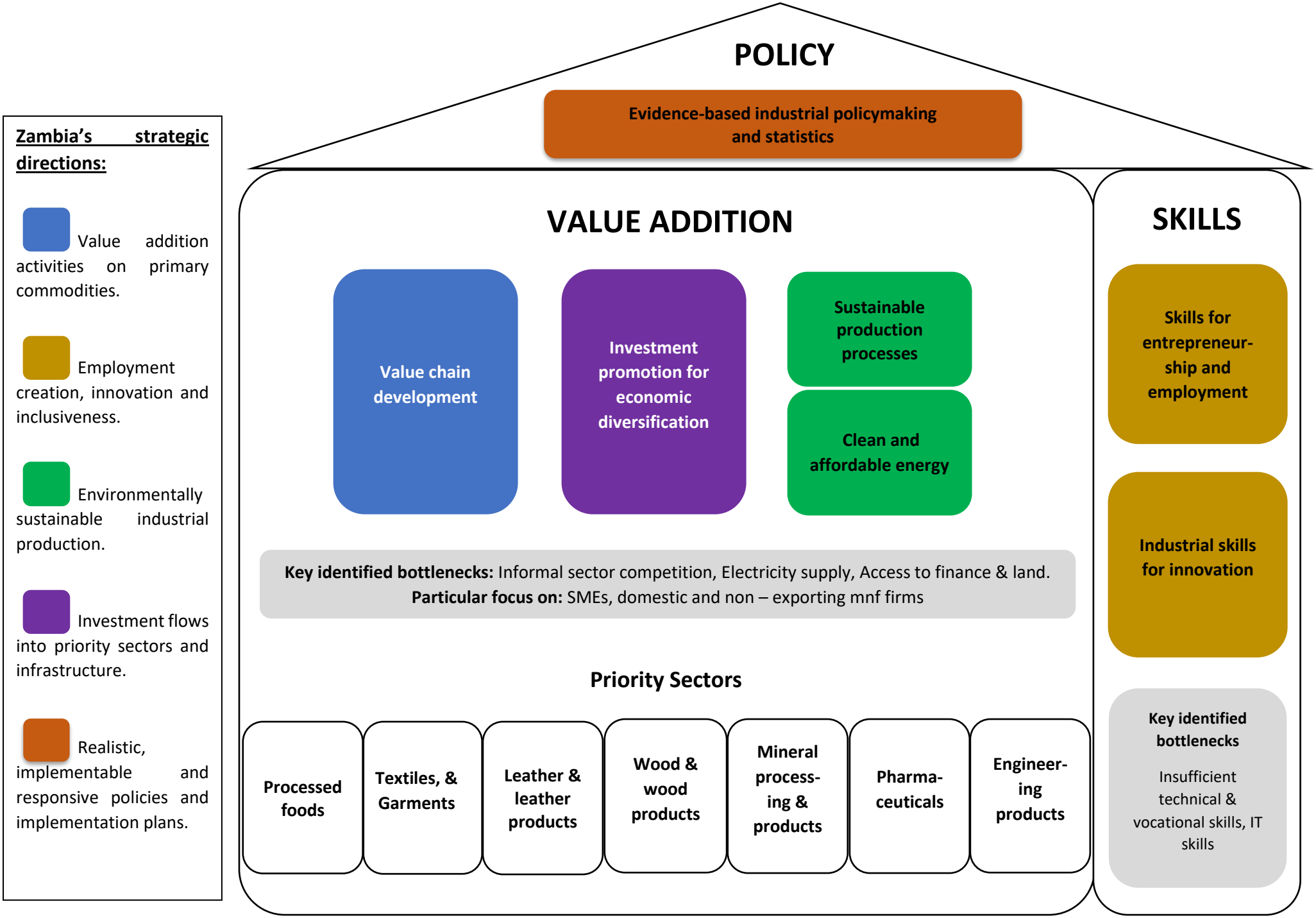
employees, stating that the costs are too high or that it would not be cost efficient to do so. Additionally, some fear that workers would be hired by competing firms after the training. The criteria for hiring new staff confirms the need for technical and vocational skills, as this is the second most sought for, after work ethics. However, the supply of technicians and associate professionals seems to be lacking in the country. The findings of the skills analysis clearly suggest that continuing and enhancing the support in technical and vocational skills in particular, can have a large influence on the competitiveness of firms and their ability to move up the value chain. In addition to improving production quantities and quality, and sales, such skills are the key ingredient for the country's innovation. Further, developing entrepreneurial and management skills help firms grow, make it easier for them to access finance or would make it easier to register informal firms. Focusing on developing skills of youth in particular, and those required for the priority sectors in specific will go a long way in increasing the impact of such activities.

BLOCK 4: FINAL SUGGESTIONS FOR PCP DESIGN

The diagram below summarizes the focus areas, components and priority sectors emerging from the study as well as the key identified bottlenecks that could help further discussions about project design. The diagram also clearly shows how the national priorities identified by the documents and the PCP priority areas are aligned. The forthcoming dialogue between the Government of Zambia and UNIDO could be facilitated by an appropriate PCP governance structure.

A governance system aligned to the recommended PCP framework will ensure smoother and more efficient collaboration between UNIDO, the Government of Zambia, other national stakeholders and development partners, which in turn will ease effective implementation of identified activities. It is recommended to establish a national coordination body to lead, stir and supervise the program, with focal points representing each component. These focal points can be matched with UNIDO technical focal points, which will ensure direct channels of communication and facilitate joint work. Working groups can be set up to support the national coordination body as necessary, which would include participation of other PCP stakeholders and are coordinated by the focal points.

Figure 25 PCP strategic map


Zambia's strategic directions:
Value addition activities on primary commodities.
Employment creation, innovation and inclusiveness.
Environmentally sustainable industrial production.
Investment flows into priority sectors and infrastructure.
Realistic, implementable and responsive policies and implementation plans.
POLICY
Evidence-based industrial policymaking and statistics
VALUE ADDITION
Value chain development
Investment promotion for economic diversification
Sustainable production processes
Clean and affordable energy
Key identified bottlenecks: Informal sector competition, Electricity supply, Access to finance & land.
Particular focus on: SMEs, domestic and non – exporting mnf firms
Priority Sectors
Processed foods
Textiles, & Garments
Leather & leather products
Wood & wood products
Mineral process-ing & products
Pharma-ceuticals
Engineer-ing products
SKILLS
Skills for entrepreneur-ship and employment
Industrial skills for innovation
Key identified bottlenecks
Insufficient technical & vocational skills, IT skills

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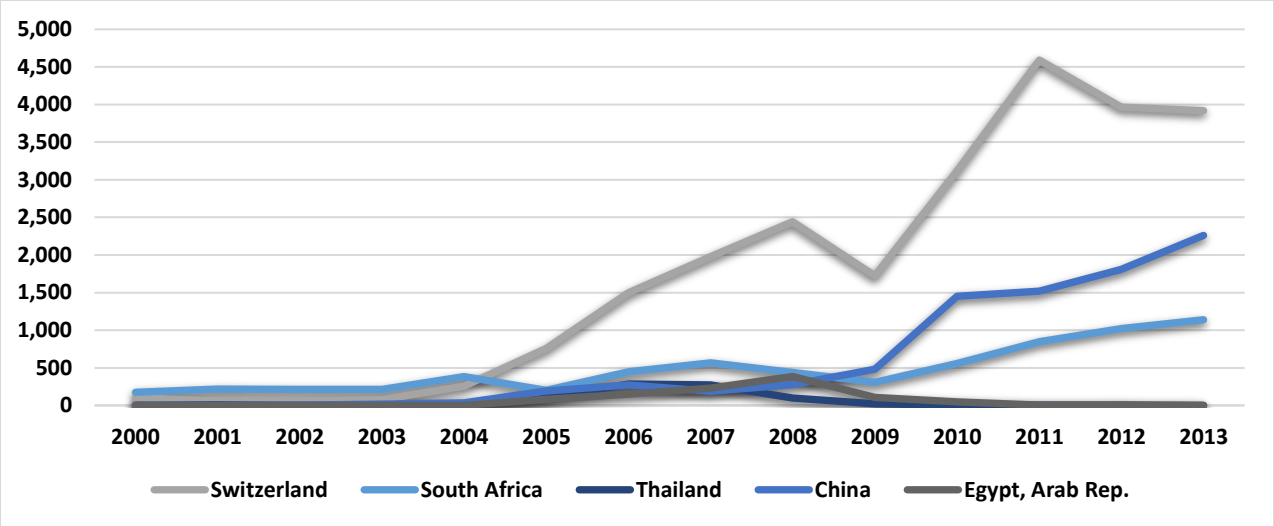
Appendix

A. Additional information to economic, social and environmental performance

A1: Zambia's exports to main destination over time

The figure below illustrates exports to Zambia's main partners during the financial and economic crisis of 2008. It shows that exports to Switzerland did decline sharply between 2008 and 2009, however, they picked up very quickly afterwards. Exports to China did not shrink during the period and there was in fact a strong boost between 2009 and 2010. Meanwhile, exports to Egypt and Thailand did reduce.

Figure 26 Zambia's main total export destinations over time (million USD)



Data source: United Nations Comtrade Database (UNSD)

A2: Women in Manufacturing

The table below illustrates that women represent a significantly smaller share of persons engaged in the manufacturing sector and particularly of top managers.

Table 27 Role of women in manufacturing (%)

	Mnf 2019 2013	Non-Mnf	Mnf. LMI	Proc. food	Textile Leather	Wood	Non-met. miner	Metals	Chem	MHT (28M-)	Dom. owned	For. owned	Large firms	SMEs	Export.	Non-exp
Share female prod. workers	23 10	0	8	10	32	1	11	3	7	6	10	9	9	10	12	10
Share female non-prod. workers	12 6	8	3	7	6	6	4	5	8	7	6	8	4	6	8	6
Female top managers	13 13	25	7	11	40	21	8	7	8	NA	15	8	12	13	11	14
Female owners	43 34	45	15	29	42	32	27	34	27	44	35	27	32	34	34	33

Data Source: World Bank Enterprise Surveys. Zambia 2013 for all columns except LMI, Zambia 2019 added to col. 1 Mnf (manufacturing).

A3: Unemployed youth

It can be noted from the table that young women are particularly more vulnerable to not being in employment or trainings compared to young men. In addition, generally people in rural areas are more prone to be idle too.

Table 28 Share of youth not in employment, education or training (NEET) by sex and rural / urban areas (%)

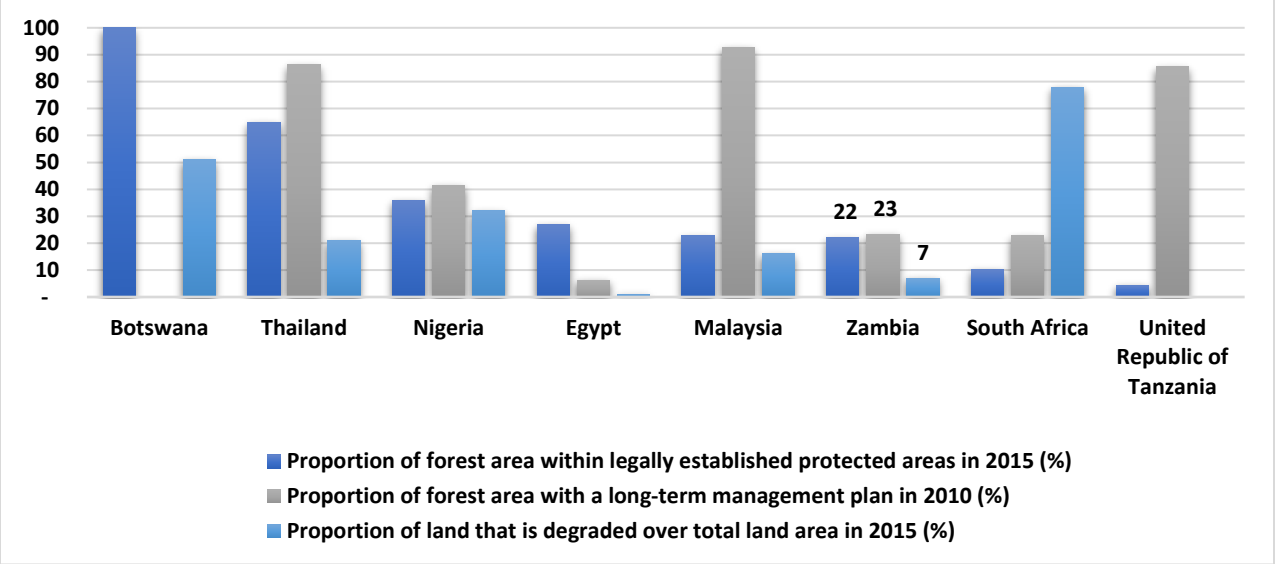
	National		Urban		Rural	
	2017	**2018**	**2017**	**2018**	**2017**	**2018**
Total	43.5	43	41.5	40.4	45.2	45.2
Male	36.4	37.3	32.6	33.3	39.4	40.4
Female	49.5	48.2	48.5	46.5	50.4	49.8

Data source: ILOSTAT database (ILO)

A4: Forest management

The figure below indicates that in Zambia only 7% of the land is degraded, however less than a quarter of the forest area has a long-term management plan or is within legally established protected areas. For most of the other countries in the graph at least one of the two latter indicators show a higher share.

Figure 27 Forest management in Zambia and comparator countries (2010 & 2015)

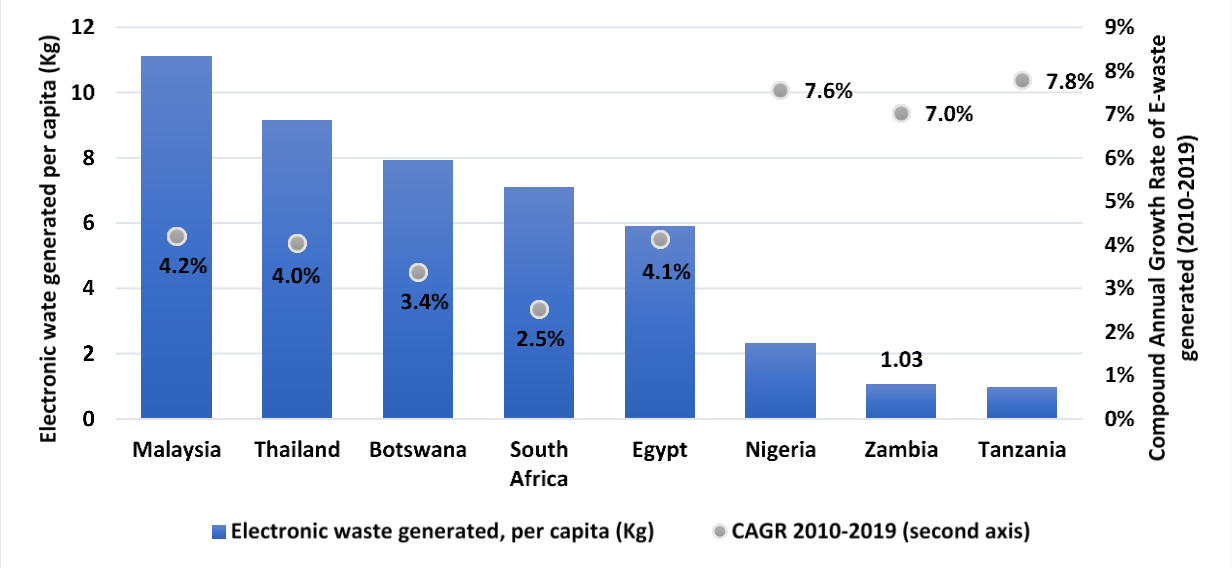


Data source: Global SDG Indicators database (UNSD)

A5: Electronic Waste

While electronic waste (E-waste) is still relatively small in Zambia, the annual growth rate is at 7%. The country has difficulties with waste management and increased e-waste puts further pressure on the problem, although it is inevitable with industrialization. Recycling of products, for example for the reuse of copper would be one solution.

Figure 28 Electronic waste generated per capita (2019)

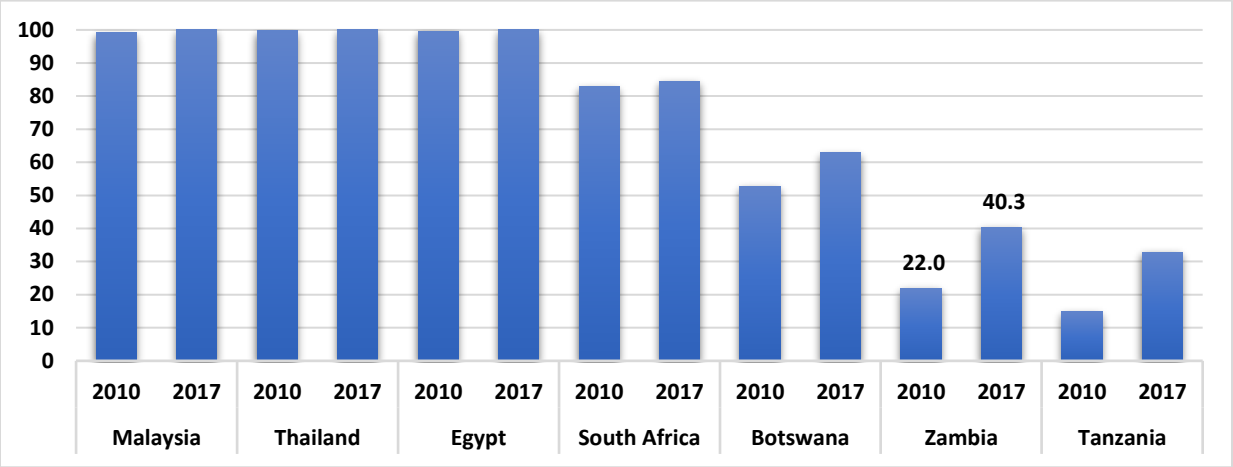


Data source: Global SDG Indicators database (UNSD)

A6: Access to electricity

The figure below shows that Zambia still faces a large challenge of electrification. Only 40% of its population have access to electricity, although this is almost a doubling from 2010.

Figure 29 Proportion of population with access to electricity (%)

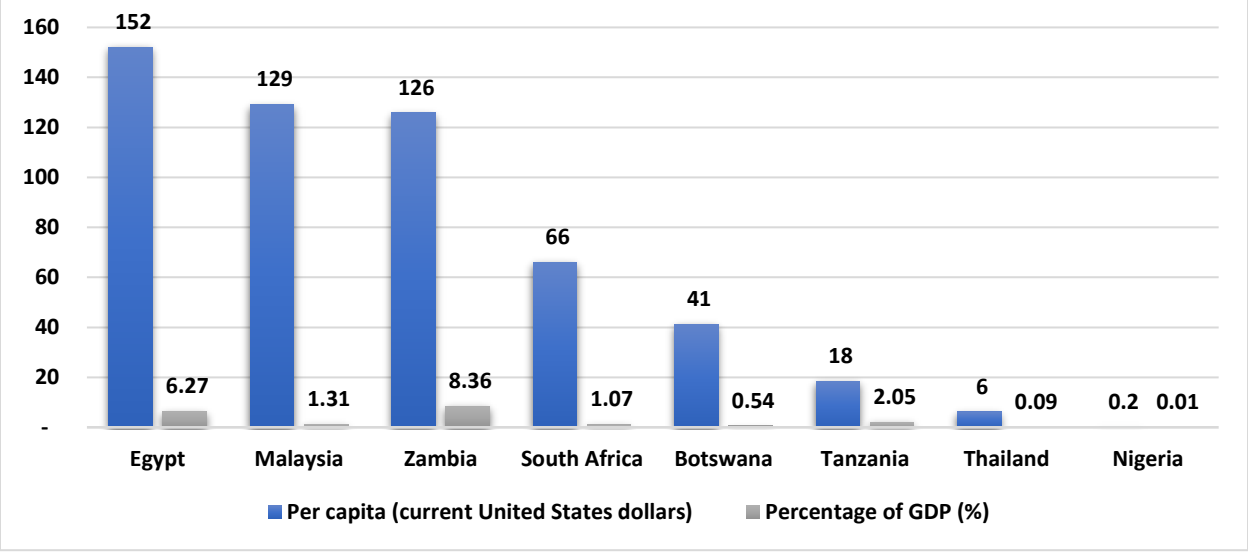


Data source: World Development Indicators (The World Bank)

A7: Fossil-fuel subsidies

Zambia's per capita value of fossil fuel subsidies is relatively high and comparable with Malaysia's. Furthermore, it constitutes the highest share of GDP. This reflects the government's efforts to diversify energy sources.

Figure 30 Fuel pre-tax subsidies, consumption and production (2017)

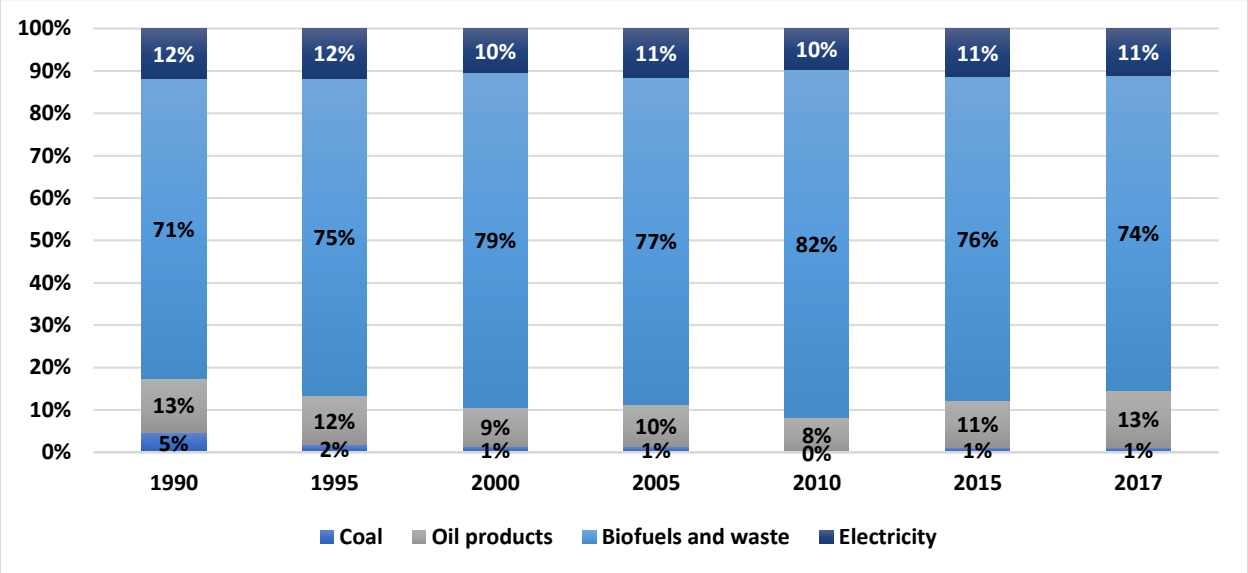


Data source: Global SDG Indicators database (UNSD)

A8: Source of energy consumption

The IEA data illustrates that 74% of energy consumption is from biofuels and waste. This is an increase from the 71% in 1990. 13% comes from oil and 11% from electricity. A high share of energy comes from renewable sources.

Figure 31 Energy consumption by source of energy, Zambia

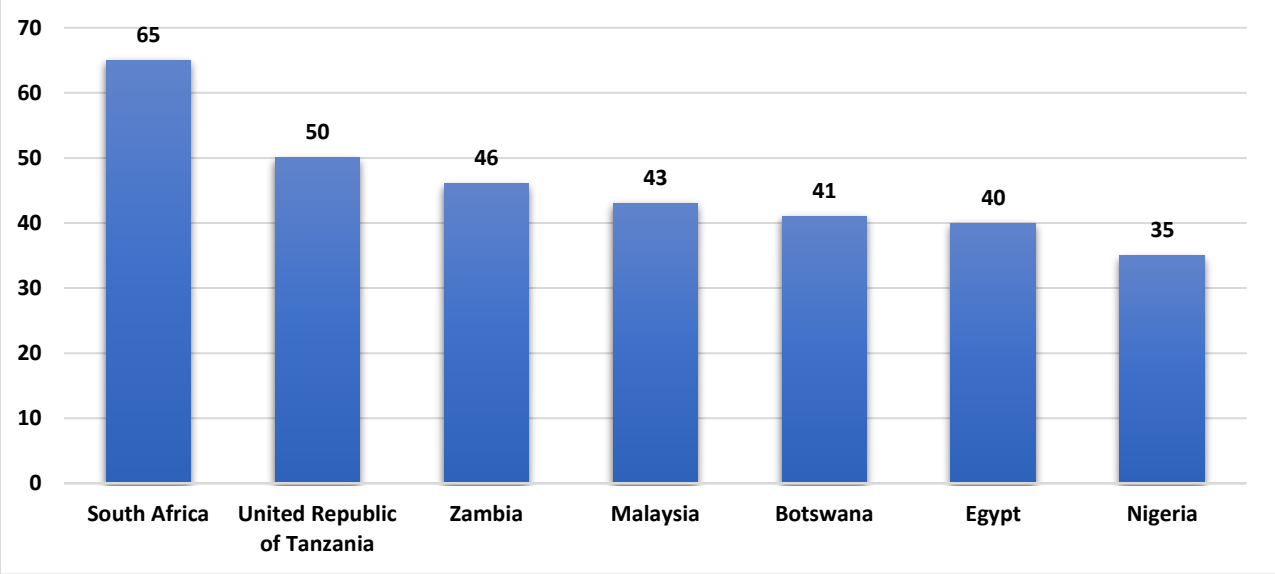


Data source: IEA Database (International Energy Agency)

A9: Water resources management

Zambia has implemented 46% of its integrated water management as defined by UNEP. South Africa and Tanzania are ahead of Zambia in this regard, while the other peer countries are lagging behind.

Figure 32 Degree of integrated water resources management implementation in % (2018)



Data source: Global SDG Indicators database (UNSD)

B. Additional information to overall governance and policy making

B1: Topics and indicators to measure overall governance in the country

1. **The process by which governments are selected, monitored, and replaced**
   a. Political stability and Absence of Violence/Terrorism – perceptions on the likelihood over a destabilization or overthrow of the government by unconstitutional or violent means.
   b. Voice and Accountability – to what extent can the citizens of the country participate in selecting the government, to what extent is there freedom of expression, association and free media.
2. **The respect of citizens and the state for the institutions that govern economic and social** interactions among them
   c. Rule of law – perception on the extent of trust in and abidance to the rules of society such as contract enforcement, property rights, the police and courts, as well as the likelihood of violence and crime.
   d. Control of Corruption - perceptions on the extent of private gain when exercising public power, including grand and petty forms of corruption and the "capture" of the state by private interests and the elite.
3. **The capacity of the government to effectively formulate and implement policies**
   e. Government effectiveness - perceptions on the quality of public services, civil service and its independence from political pressure, policy formulation and implementation and the trust in the government's commitments to policies.

f. Regulatory quality – perception of the government's ability to develop and implement policies and regulations for private sector development.

B2: Indicators for the assessment of policymaking

The table below lists the indicators and data sources per topic assessed in terms of capacity to make policies. They use differing datasets which provide slightly differing years of analysis. The strong differences in methodologies make it difficult to compare values between the topics, although changes in the values over the years and a comparison with LMI average is generally acceptable.

Table 29 Topics, indicators and sources for assessment of policymaking in Zambia

Topic	Indicators	Source
Policy design: Coordination	Extent of policy coordination (score)	Governance Index (Bertelsmann Stiftung - BTI)
	Civil society participation (score)	
	Prioritization in policy making (score)	
Policy design: Adaptability and future orientation	Adoption of a long-term vision (score)	Global Competitiveness Index (WEF)
	Responsiveness to change in policy making (score)	
Implementation	Effective implementation of policies (score)	Governance Index (Bertelsmann Stiftung - BTI)
Monitoring	Statistical capacity (score)	Statistical Capacity indicators (World Bank)
Learning	Learning for innovative policies (score)	Governance Index (Bertelsmann Stiftung - BTI)

Note: Simple averages are calculated where the topic has more than one indicator.

C. Technical appendix for meso analysis

C1: Definition of Priority Sectors and Concepts

The sectoral analysis builds on the international manufacturing sector classification ISIC Revision 3 and is obtained from INDSTAT. We aggregate the manufacturing industries of Zambia according to 'Priority Sectors' (PS) as defined by Zambian officials (National Industrial Policy 2018, page 14). The PS can be matched to these ISIC aggregates reported for Zambia. Even though the PS provide a wider classification of multiple ISIC industries, it is important to note that the manufacturing (not mining) component of the copper production is self-contained and can therefore be identified most accurately; see Table 30.

Table 30 ISIC Sector Classification Correspondence, Zambia

Conversion between ISIC Rev. 3 and Rev. 4

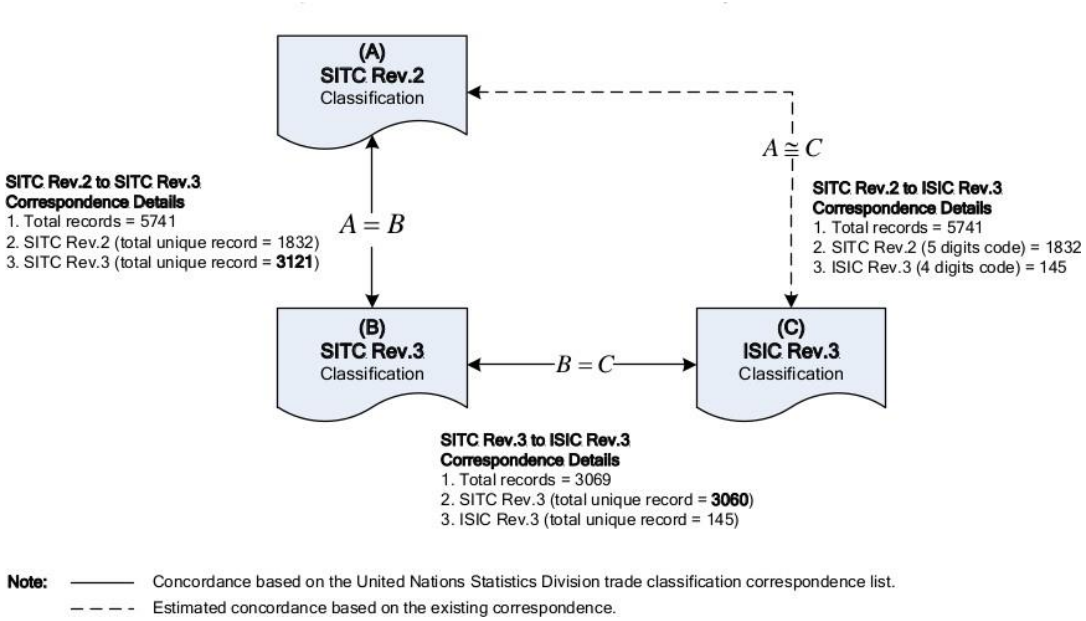
ISIC Rev. 3 Official	ISIC Rev. 3 Zambia	ISIC Rev. 4 Official	ISIC Rev. 4 Zambia	Priority Sectors Zambia
15	15A	10+11	1010D	Processed Foods
16		12		
17	17 D	13	131D	Textiles and Garments + Leather and Leather Products
18	no data	14	no data	
19	17 D	15	131D	
20	20	16	16	Wood and Wood products
21	21	17	17	Paper products (no priority)
22	no data	18	no data	Printing/publishing (no priority)
23	23 E	19	1910 E	Oil and non-metallic minerals
24	24A	20+21	201D	Chemicals, plastic, synthetic rubber etc
25		22		
26	23 E	23	1910 E	Oil and non-metallic minerals
27	27	24	24	(6.b) Basic metals
28	28 M	25	251E	Fabricated metal products
30+32+33(30F)	28 M	26	251E	Medium-/high-tech cluster. Fabricated engineering.
29		28+33		
34		29		
35	no data	30	no data	(no priority)
36		31		
36		32		

Please note that the medium-/high-technology sector cluster 28M contains several ISIC 2-digit industries[57] out of which we extract - whenever sensible - sector 28 *Manufacture of fabricated metal products, except machinery and equipment*. Whenever we do so we refer to the medium-/high-technology as '28M', the extracted sector of *Manufacture of fabricated metal products, except machinery and equipment* as '28' and the medium-/high-technology *minus* sector 28 as '28M-', respectively.

C2: Matching Trade Data to Manufacturing Sectors

The trade flows used in this analysis were obtained from UN-COMTRADE and follow the SITC Rev.2 and Rev.3 at 5-digit level, respectively. Correspondence between both SITC goods classifications and the manufacturing sector classification following the ISIC standard is established by Affendy, Sim Yee, and Satoru (2010) and the UN-Stats and are visualized in Figure 33.

Figure 33 Correspondence of SITC and ISIC Classification following Affendy, Sim Yee, and Satoru (2010).



Note that with this concordance SITC 5-digit trade information can be linked to 4-digit manufacturing data. Throughout the report only trade in commodities is considered. Consequently, whenever talking about trade import/exports related to manufacturing industries we refer to *traded commodities that can be attributed to a certain manufacturing sector*.

Aggregating sector information from the 4-digit to the 2-digit level can then be performed by simply summing up all 4-digit industries that belong to a particular 2-sector industry or, alternatively, one of

[57] The aggregate contains sectors 28 to 34 (25 to 29 + 33) according to ISIC Rev.3 (Rev.4); the industries included are: *Manufacture of fabricated metal products, except machinery and equipment* (ISIC Rev. 3, 28), *Manufacture of machinery and equipment n.e.c.* (29), *Manufacture of office, accounting and computing machinery* (30), *Manufacture of electrical machinery and apparatus n.e.c.* (31), *Manufacture of radio, television and communication equipment and apparatus* (32), *Manufacture of medical, precision and optical instruments, watches and clocks* (33) and *Manufacture of motor vehicles, trailers and semi-trailers* (34).

Zambia's priority sectors.

C3: Construction of UNIDO-Value-Added Database

C 3.1: Aggregation

In order to guarantee representative results, UNIDO INDSTAT data across countries is aggregated to correspond to the aggregates as available for Zambia. The data is aggregated given the Zambia's priority sector aggregates where output and value added are aggregated across the corresponding 2-digit industries and the Index of Industrial Production for industries *i* of industry aggregate *j*, $i \in j$ in period *t* is weighted by the corresponding industries' output weights of industry aggregate *j* as

$$IIP_{j,t} = \sum_{i \in j} w_{i,t} \times IIP_{i,t}, w_{i,t} = \frac{Output_{i,t}}{\sum_{i \in j} Output_{i,t}}$$

Another practical issue arises from the fact that IIPs are **not** reported for any sector aggregate, e.g. 30F, but only for their corresponding industries, i.e. 30, 32 and 33. In these cases we take the arithmetic (unweighted) average over all affected industries *i* in aggregate *j*.

Aggregation across multiple industries may generate artificial volatility if not all *i* industries of aggregate *j* are reported in the same period, say, period *t* but are reported in $t-1$ and $t+1$. This issue becomes more frequent the more industries are grouped together, that is, it is a particular concern for PS 28M. The issue is addressed by eliminating sector *j* for period *t* in the final data set altogether. This aggregation step also incorporates alternative aggregates of industry aggregate, say, *k* as long as $i \in k, k \in j$. A practical example: Up to period *t* industries 30 and 32 are reported separately and aggregated into 28M; accordingly, however, in period $t+1$ 30 and 32 are now reported jointly as 30F. Since 30F is still contained in 28M the new sector aggregate is still aggregated into 28M for $t+1$.

C 3.2: Deflation

In order to calculate real value added series of industry aggregate *j* at time *t* the following formula is used

$$rVA_{j,t} = nVA_{j,t} \times Deflator_{j,t}$$

where rVA and nVA refer to real and nominal value added respectively, and the deflator term is calculated as

$$Deflator_{j,t} = \frac{Output_{j,t=2010}}{Output_{j,t}} \times IIP_{j,t}$$

C 3.3: Extraction of Sector 28

For the extraction of sector 28 from 28M, a constant share of 30% of sector 28 in 28M is assumed on the basis of UNIDO concordance information. Consequently, the value added proportion of sector

- 28 is calculated as 28 = 28M *0.3
- and that of 28M as 28M- = 28M - 28 = 28M *0.7.

and should therefore be taken with caution. What is more, because of the way sector 28 was extracted from the medium/high-technology cluster, it generally does not follow that a result of either 28 or 28M- is informative on the aggregated outcome for 28M.

C 3.4: Empirical Model

We estimate a panel fixed effects model in order to analyse the development patterns for *j* industry aggregates of manufacturing of which the group of X industries is discussed in greater depth. For each industry aggregate *j* we estimate

$$y_{cjt} = \alpha_{cj} + \boldsymbol{\beta}_j \boldsymbol{X}_{cjt} + \tau_{j,t} + \varepsilon_{cjt}$$

where y_{cjt}, is the log of real value-added per capita of country c's industry aggregate j in period t. Please note that this model is estimated separately for all j individual industries and we retain subscript j to highlight this feature of our model. The explanatory variables in X contain the logs of real GDP per capita (Expenditure-side real GDP at chained PPPs) and are added in their linear, quadratic, and cubic representation. Furthermore, α_{cj} and τ_{jt} denote country and time effects. GDP6 and population data is taken from Penn World Table version 9.1 (Feenstra et al., 2015) while income group data is taken from World Bank Country and Lending Groups. Since the last available year of INDSTAT data is 2017 we also use the World Bank income group classification for 2017 for country classifications.

C4: Sector-level Imports (IMX)

Complementing the use of simple import growth rates, the analysis introduces the concept of the 'Import index' which is, given the base year in t = 2005, is given by

$$IMX_t = \frac{Import_t}{Import_{t=2005}}$$

and its relationship to growth rates is straightforward:

$$Simple\ growth\ rate := gr(t, t-1) + 1 = \frac{Import_t}{Import_{t-1}} = \frac{Import_t / Import_{t=2005}}{Import_{t-1} / Import_{t=2005}} = \frac{IMX_t}{IMX_{t-1}}$$

$$CAGR := cagr(t = 2005 + n, t = 2005) + 1 = \left(\frac{Import_{t=2005+n}}{Import_{t=2005}}\right)^{1/n} = (IMX_{t+n})^{1/n}$$

Please note that $Import_t$ refers to the aggregated imports of commodities that can be attributed to a specific manufacturing aggregate (either ISIC Rev. 3 2-digit or 4-digit level) in period *t*.

C5: Revealed Comparative Advantage (RCA)

Balassa (1965)'s RCA for country *i* in good *j* is given by

$$RCA_j^i = \frac{X_j^i / X^i}{X_j / X}$$

Where X_j^i is country *i*'s export of good *j*, $X^i = \sum_j X_j^i$ is country *i*'s aggregate exports, X_j is world exports of good j, and $X = \sum_j X_j$ is world aggregate exports.

When mapping SITC to ISIC, many SITC goods end up in one ISIC group. In order to get from goods-level data to industry-level data we need to aggregate: Suppose good *j* belongs to ISIC sector *s*. We then calculate the weighted average RCA of sector *s* for country *i* (where N_s denotes the number of goods *j* in sector *s*) as

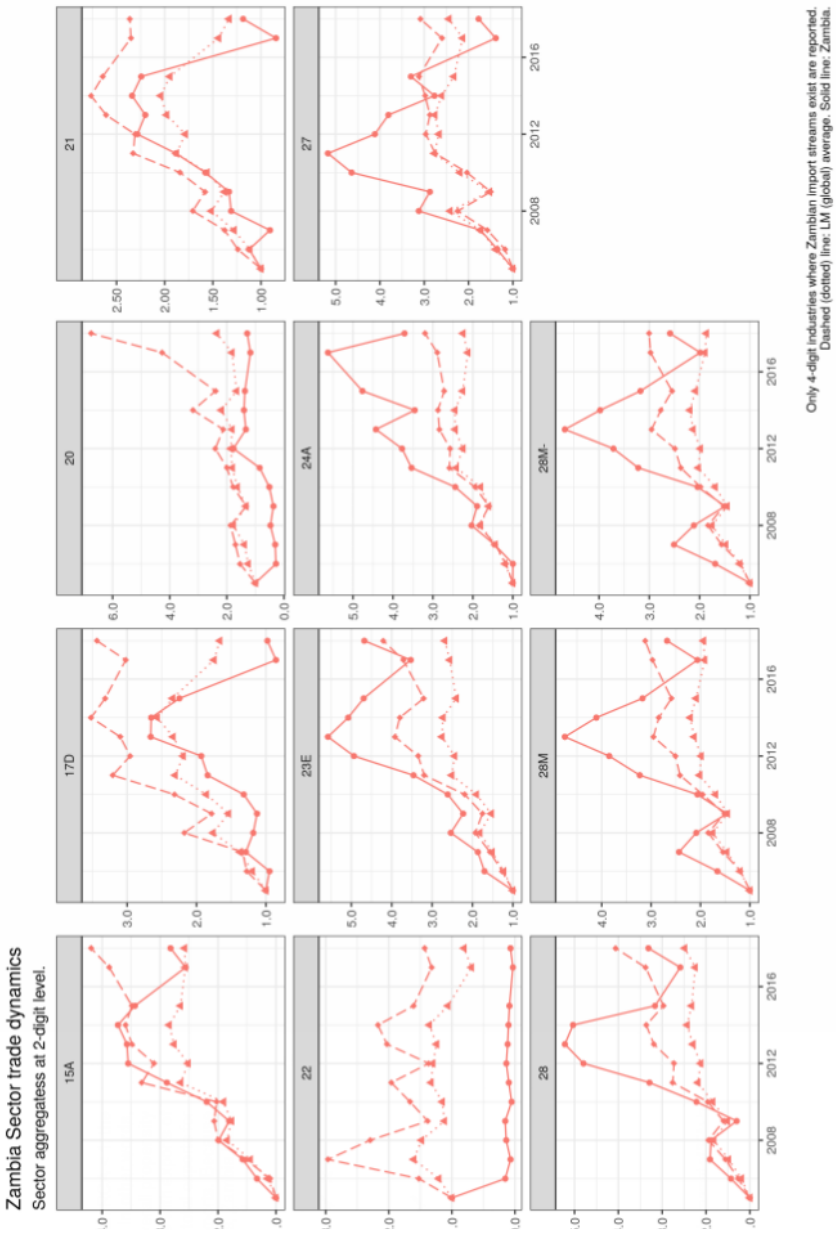
$$RCA_s^i = \frac{1}{N_s} \sum\nolimits_{j \in s} w_j^i \times RCA_j^i, \qquad w_j^i = \frac{X_j^i}{\sum_{j \in s} X_j^i}$$

D. Additional results for meso analysis

D1: Sector-level Imports (IMX)

Figure 34 corresponds to the findings in Table 11. It illustrates that the relatively lower import growth rate of sector 28M is the result of a considerable reduction of imports during the last years. Before that Zambia's imports (solid line) for 28M had grown to be considerably larger than either the global (dotted line) or lower-middle income (dashed) average. As a matter of fact, similar dynamics with a strong dip during the last 2/3 recorded years have been recorded for the majority of sector aggregates.

Figure 34 Sector-level imports (IMX) ISIC 2-digit industry and Zambia sector aggregate over time



Note: Sector 15A corresponds to Processed food, 17A is Textile garments and leather products, 20 = Wood and wood products, 21 = Manufacture of paper and paper products, 22 = Publishing an printing, 23E = Oil and non - metallic minerals, 24A = Chemicals, plastics and rubbers, 27 = Basic metals, 28 = Fabricated metal products, 28M- = Medium & high-tech sectors excluding fabricated metals and chemicals and 28M is sector 28M- plus sector 28. This classification combines the standard ISIC rev. 3 classification and Table 5 sectors groups that take into account Zambia industrial data availability.

D2: Latent Comparative Advantage (LCA)

Explanation of LCA Analysis

Figure 35 visualizes the results of the LCA analysis. The figure plots real value added as obtained through UNIDO's Value-Added database against per capita GDP figures to visualize the value added contribution of manufacturing industries (in the case of Figure 35 sector 15A is visualized) as GDP levels rise. The results for the global average trend are shown by the grey line and indicates that sector 15A becomes less dynamic at higher income levels, i.e. the curve starts to flatten out from a GDP per capita level of approximately 22,000 USD. Similar estimated patterns for the group of lower middle-income countries are shown in black and illustrate a more dynamic behavior around per capita GDP levels of around 8,000 USD.

Figure 35 Visualization of LCA analysis for sector food, beverages and tobacco (15A)

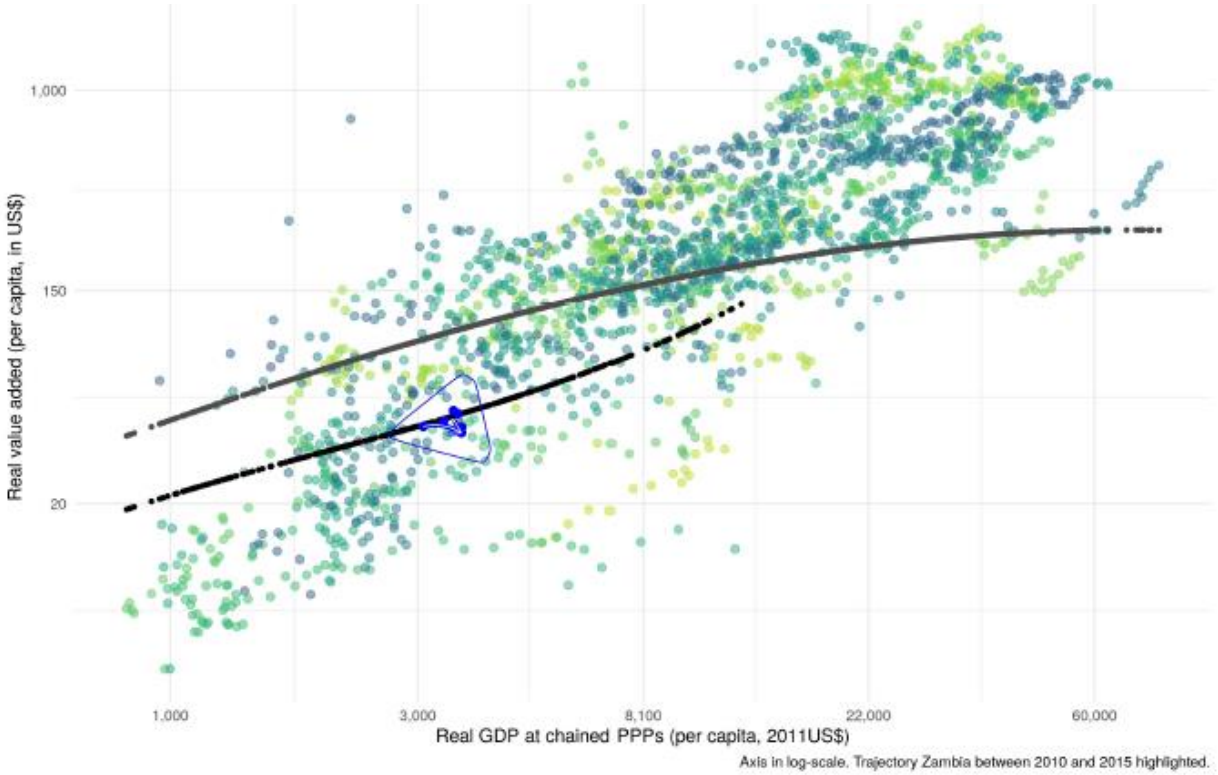


Figure 35 also highlights the position of Zambia's sector relative to the global and lower middle-income average trend: The observations for Zambia are presented in blue and the arrow indicates the 'direction'

of where Zambia's sector 15A is developing as the start point of the arrow corresponds to the first year of observation and the end point to the last country observation for Zambia. The 'gap' corresponds to the difference in real value added (y-axis) between the last observation of Zambia (highlighted by the end point of the arrow) and that of the model estimates of an average lower-middle income country at similar per capita GDP levels, with a similar endowment structure and a similar point of time. The arrow indicates that the trend for Zambia's sector 15A is much flatter than that of the average lower middle-income country. This indicates that despite the relative similar measured performance, the growth trend for Zambia's sector 15A is less dynamic than for the average lower-middle income country. This is summarized as a 'less dynamic' trend (Table 31). For other sectors a dynamism analysis is conducted with a similar approach.

Table 31 Latent Comparative Advantage (LCA) of manufacturing industries, trend

Sector aggregates	Reported VA Zambia	Predicted VA LMI	VA gap	Zambia vs. LMI av.	
				Trend	Level
Processed foods (15A)	39.08	46.84	-7.76	Less dynamic	Below
Textiles, garments & leather products (17D)	0.58	16.91	-16.33	Less dynamic	Below
Wood and wood products (20)	2.79	4.36	-1.57	Similar	Below
Oil and non-metallic minerals (23E)	17.37	22.88	-5.51	More dynamic	Below
Basic metals (27)	48.83	9.08	39.75	More dynamic	Above
Fabricated metals (28)	4.19	3.81	0.38	Similar	Above
Chemicals, plastics & rubber (24A)	6.56	14.69	-8.13	Less dynamic	Below
Medium & high-tech sectors excluding fabricated metals and chemicals (28M-)	9.77	29.27	-19.50	Less dynamic	Below

Data source: INDSTAT database (UNIDO)

The value added gap therefore provides a good measure of relative performance: A positive gap indicates that Zambia's sector performs better than one would expect for an average lower-middle income country at a similar point in time and a similar GDP per capita level. Conversely, a negative gap indicates a relative worse performance of Zambia's industry aggregate. As can be seen in Figure 35, Zambia's sector 15A is performing very similarly (yet slightly below) to what is expected for an average lower-middle income country at a similar point in time and a similar GDP per capita level. This qualification is possible as the last two columns (VA/GDP share; actual vs. predicted %) provide some further context regarding the severity of the VA gap. As can be readily seen, the actual value-added contribution of Zambia's sector 15A is 1.07% of GDP while it is about 1.29% for an average LMI country. Even though there is a VA gap for sector 15A it is moderately small (0.22 percentage points). This stands in stark contrast to the textile and garments cluster (17D) which is found to underperform very significantly compared to the lower middle-income average (Table 32).

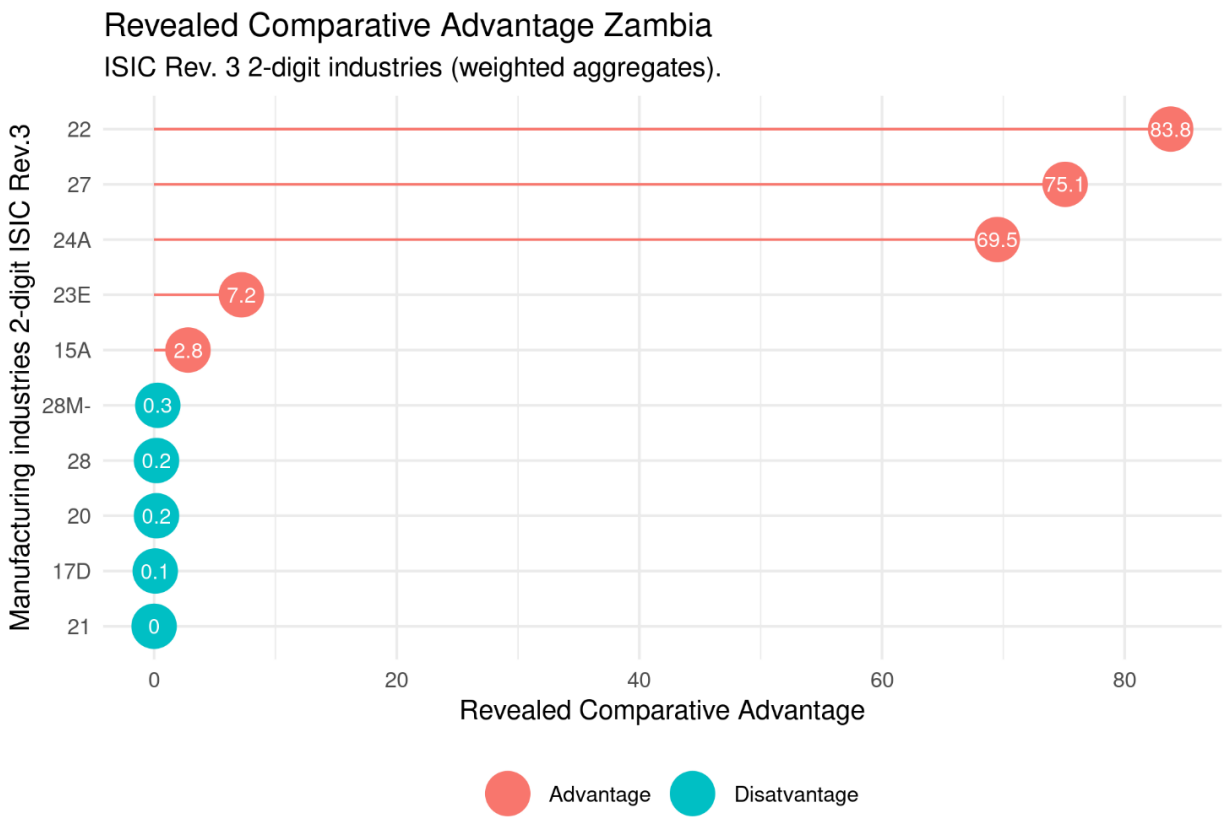
Table 32 Latent Comparative Advantage (LCA) of manufacturing industries, VA/GDP shares

Sector aggregates	Reported VA Zambia	Predicted VA LMI	VA gap	VA/GDP Share	
				Reported %	Predicted %
Processed foods (15A)	39.08	46.84	-7.76	1.07	1.29
Textiles, garments & leather products (17D)	0.58	16.91	-16.33	0.02	0.46
Wood and wood products (20)	2.79	4.36	-1.57	0.08	0.12
Oil and non-metallic minerals (23E)	17.37	22.88	-5.51	0.48	0.64
Basic metals (27)	48.83	9.08	39.75	1.34	0.25
Fabricated metals (28)	4.19	3.81	0.38	0.11	0.10
Chemicals, plastics & rubber (24A)	6.56	14.69	-8.13	0.18	0.41
Medium & high-tech sectors excluding fabricated metals and chemicals (28M-)	9.77	29.27	-19.50	0.27	0.80

Data source: INDSTAT database (UNIDO)

D3: Revealed Comparative Advantage (RCA)

Figure 36 Revealed Comparative Advantage (RCA) Zambia 2018



Data source: United Nations Comtrade Database (UNSD)

D4: Import CAGRs alternative time span

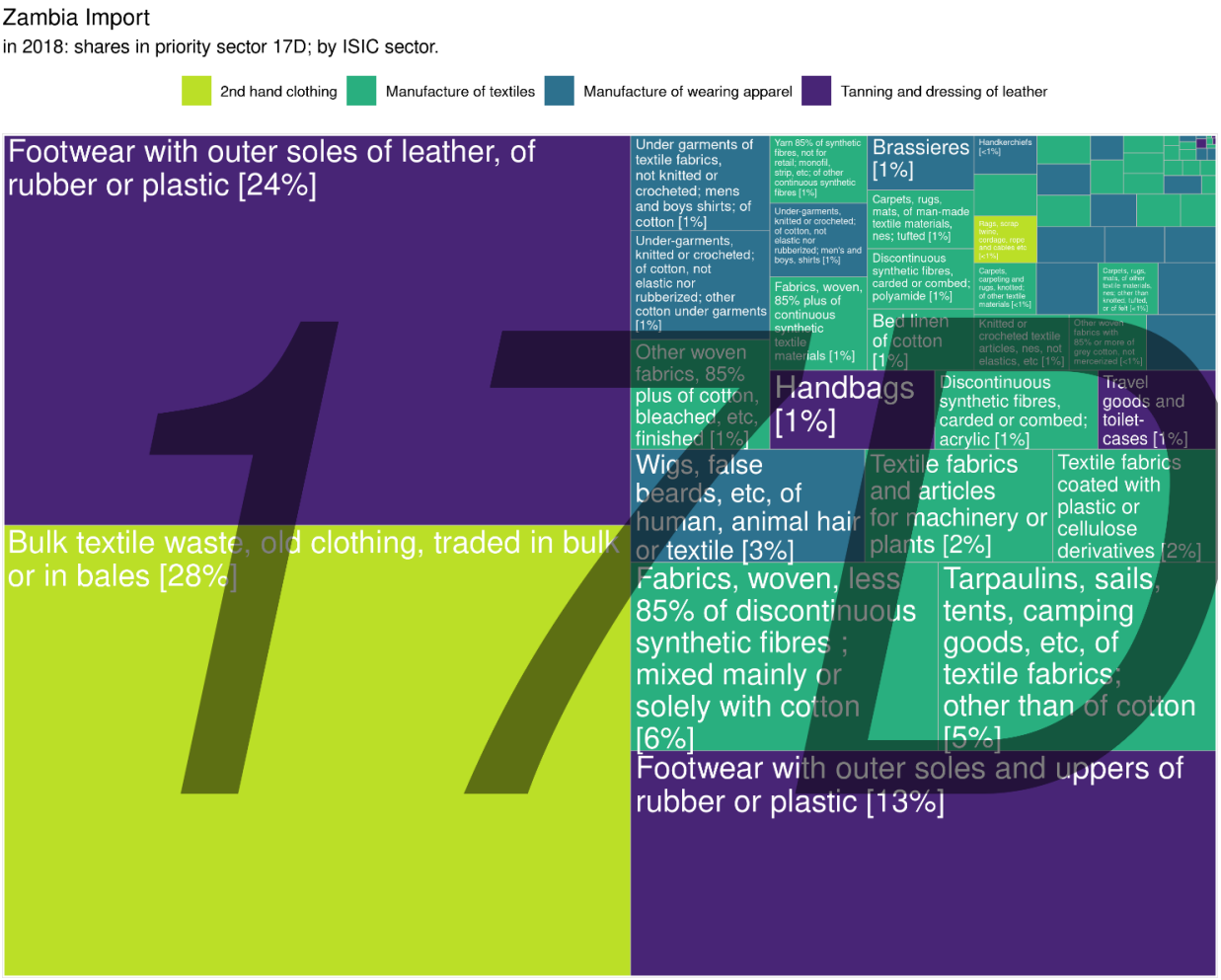
Table 33 CAGRs of Imports, alternative time span: 2005 to 2018

Sector aggregates	Zambia	LMI av.	World av.	Criterion 3 (alternative time span)
Processed foods (15A)	8.30	11.65	7.56	Above
Textiles, garments & leather products (17D)	-0.17	9.96	4.00	Below
Wood and wood products (20)	1.96	15.83	6.79	Above
Oil and non-metallic minerals (23E)	12.60	11.69	7.89	Above
Basic metals (27)	4.50	9.06	7.12	Above
Fabricated metals (28)	9.65	11.39	7.26	Above
Chemicals, plastics & rubber (24A)	10.61	9.35	6.43	Above
Medium & high-tech sectors excluding fabricated metals and chemicals (28M-)	7.58	8.83	4.91	Above

Note: 'World av.': World average. 'LMI av.': Lower-middle income country average (World Bank, 2020). Column (5) compares II-digit CAGRs in column (4) with the global manufacturing import CAGR which is 4.52% for the period 2005 to 2018.
Data source: United Nations Comtrade Database (UNSD) and World Development Indicators (The World Bank)

D5: Contribution of 2nd hand clothing in textile-related imports

Figure 37 Contribution of 2nd hand clothing in textile-related imports (2018)



Note: Textile-related imports' encapsulate all traded commodities that can be attributed to manufacturing priority sector textiles and garments plus leather and leather products (17D) plus commodities that can be associated to 2nd hand clothing (SITC Rev.: 269 - Old clothing and other old textiles articles; rags) that otherwise are classified as 'manufacturing not else classified' in sector 36 according to ISIC Rev. 3.

D6: sector analysis for sectors Paper and paper products (21) and Printing and publishing (22)

Although the below are not priority sectors, the analysis for the paper and paper products (21) and printing and publishing (22) sectors is presented below for the purpose of interest, due to data availability.

Table 34 Summary analysis at II-digit

Sector aggregates	LCA	RCA	Import CAGR	Import Levels	Employment intensity
(21) Paper and paper products	Below	<1	Below	Below	Below
(24A) Chemicals, plastics and rubber	Below	>1	Below	Above	Below

Table 35 Latent Comparative Advantage (LCA)

Sector aggregates	Reported VA Zambia	Predicted VA LMI	VA gap	VA/GDP Share		Zambia vs. LMI av.	
				Reported %	Predicted %	Trend	Level Criterion 2
(21) Paper and paper products	2.89	2.91	-0.02	0.08	0.08	Less dynamic	Below
(24A) Chemicals, plastics and rubber	6.56	14.69	-8.13	0.18	0.41	Less dynamic	Below

Table 36 Compound annual growth rates of imports

Sector aggregates	Zambia	LMI av.	World av.	Criterion 3
(21) Paper and paper products	-2.17	3.93	-1.53	Below
(22) Printing and publishing	2.27	-2.72	-5.90	Below
(24A) Chemicals, plastics and rubber	3.28	6.21	3.27	Below

Table 37 Import levels 2018

Sector aggregates	Zambia	LMI av.	World av.	Criterion 4
(21) Paper and paper products	0.102	0.381	1.681	Below
(22) Printing and publishing	0.149	0.213	1.867	Below
(24A) Chemicals, plastics and rubber	3.28	6.21	3.27	Below

Table 38 Employment intensity

Sector aggregates	Zambia	LMI av.	Global av.	Criterion 5
(21) Paper and paper products	1.32	6.30	2.88	Below
(22) Printing and publishing	-	9.08	4.46	Below
(24A) Chemicals, plastics and rubber	11.70	5.08	2.98	Below

Table 39 Summary analysis at IV-digit level

II-digit sector name (ISIC Rev. code)	IV-digit subsector name (ISIC Rev. 3 code)	Capacities		Market analysis	
		RCA (C1)	0.3 < RCA< 1 & pos. trend (C2)	Global demand dynamism(C3)	Highest imports by sector (C4)
Paper and paper products (21)	pulp, paper and paperboard (2101)			0.27%	x
	corrugated paper and paperboard (2102)			8.49%	
	other articles of paper and paperboard (2109)				X
Printing and publishing (22)	publishing of books and other publications (2211)				x
	other publishing (2219)	x		17.36%	x
	service activities related to printing (2222)			4.73%	
Chemical sector (24A)	basic chemicals, except fertilizers and nitrogen compounds (2411)	x			
	manufactured fertilizers and nitrogen compounds (2412)	x			X
	pharmaceuticals, medicinal chemicals and botanical products (2423)				X
	soap and detergents, cleaning and polishing (2424)			13.87%	
	other manufactured chemical products not elsewhere specified (2429)	x			
	man-made fibres (2430)			16.60%	
	rubber tyres and tubes; retreading and rebuilding of rubber tyres (2511)		x		

E. Bottlenecks analysis - Methodology and survey information

E1: Methodology Bottleneck Analysis

This section introduces the methods used to identify so-called 'bottlenecks' using the World Bank's micro surveys. There is a wealth of information contained in the surveys and it is necessary to reduce and condense this information.

E.1.1: Overall approach

The analysis of the survey data resulted in 16 overall topics, each of which represents a potential bottleneck to firms. They are

- Electricity
- Telecommunication
- Transportation
- Customs
- Access to land
- Crime
- Access to finance
- Tax rates
- Tax administration
- Business licencing and permits

- Political instability
- Corruption
- Courts
- Labor Regulations
- Inadequately skilled labor force
- Practices of the informal sector

It is necessary to rank these topics by their severity to focus the attention on the most pressing issues. Every survey question can be analysed across a variety of dimensions. We can compare values across countries, across sectors, across different firm sizes and so forth. However, as the PCP is clearly focused on industrialisation, we compare and rank potential problems first on the level of the manufacturing sector. In addition, we will always highlight (i) how a topic (on the manufacturing level) compares to the average of other lower-middle income countries and (ii) who is affected most.

We combine questions from the Enterprise Surveys, the Skill Surveys as well as the Innovation Surveys. The different surveys are not available for all countries equally and surveys used in the present analysis were conducted in different years between 2013 and 2019. For the enterprise and innovation survey we will compare Zambian manufacturing values to an average of other lower-middle income countries. For questions from the skill survey, we can only compare Zambian values to Tanzanian values as there are no other comparable surveys available.[58]

E.1.2: Interpretation

The typical survey question is analysed using Table 40. It reports values per group (column) and answer (row). The first cell would be interpreted as the share of manufacturing firms that gave answer 1. This can be compared to non-manufacturing sectors as well as to a benchmark (group of) country(ies). Further, values will be disaggregated across different dimensions such as priority manufacturing sectors[59], some of which are lower tech, others medium to high-tech. For interventions targeting FDI, it might be advantageous to distinguish domestically vs. foreign owned firms. As SMEs are already a defined target group in many policies, we compare them to large firms (100 employees or larger). Finally, to see if exporters might be differently affected by bottlenecks, we compare them to non-exporting firms.

Table 40 Typical table for analysis

	Manufacturing Zambia	Non-manufacturing Zambia	Manufacturing Benchmark countries	Priority Manufacturing Sectors							Domestically owned	Foreign owned	Large firms	SMEs	Expo	Non-exp.
Answer 1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Answer 2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Answer 3	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·

Potential answers in the World Bank surveys range from providing an absolute number or a share, to naming a topic or choosing from a category. When answers are in terms of numbers or shares, the values

[58] Appendix E3 describes the data in more detail.
[59] Refer to Table 5 for details.

in the table refer to average values. When answers are given in terms of choosing from a category values in the table refer to the share of firms that gave a specific answer. Example: Say firms could answer by 'Yes', 'No', 'Don't know' or 'Does not apply'. Depending on the context, the table would for example present the share of firms in a subgroup that answered 'Yes'.

E.1.3: Choosing priorities

In order to rank challenges by severity, it would be difficult to compare values across very different questions. Would it be more important to solve power outages for 10% of large firms in Lusaka or speed up customs procedures for 15% of firms in the clothing sector? [60]

In practice the choice of priorities is based on many aspects such as political priorities or cost-benefit analyses. This report gives an additional dimension to this choice. There is one questions for every of the 16 topics that is comparable. It asks the survey participants to rate how much the specific topic represent an obstacle to the operation of their firm. They can answer in five categories from 'Very severe obstacle' to 'No obstacle'. We use these 16 questions to calculate the share of firms that reported a topic as a very severe or major obstacle to their operation.

This will be one of the main strategies to define the severity of problems. As mentioned before, there will be comparisons to other countries to help determine the priorities. However, even if a problem is comparably smaller in Zambia, it does not make it less severe for Zambian firms. The most important topics and challenges will be analysed in greater detail.

E2: The World Bank Enterprise and Innovation Surveys

The most recent Zambian WB enterprise survey was conducted in 2019 and was released only shortly before the publication of this document. Most tables that are based on the Enterprise Survey, use 2013 numbers because the number of manufacturing observations decreased significantly in the 2019 survey. There is also very little overlap between the survey participants in both years. For the manufacturing sector as a whole, 2019 numbers are still included to see a general trend. Zambia is in the group of lower-middle income countries by 2020 and was so in 2013. Results from the enterprise survey are compared to averages from a group of other lower-middle income countries. They include (year of survey in parenthesis):

- Egypt (2013)
- Ghana (2013)
- India (2014)
- Nigeria (2014)
- Pakistan (2013)
- Sudan (2014)
- Vietnam (2015)

[60] Numbers are only exemplary.

The World Bank also conducted a follow-up Innovation Survey, which means the same firms answered both surveys. This is true for the Zambia survey of 2013 but not (yet) for 2019. The availability of innovation surveys additionally drives the choice of comparator countries.[61]

The total number of observations by country and for the manufacturing sector are shown in Table 41.

Table 41 Country and sector coverage, WB Enterprise and Innovation Surveys

Country	Total no. obs.	Manufacturing no. obs.
Egypt, Arab Rep.	2,897	2,015
Ghana	720	377
India	9,281	7,163
Nigeria	2,676	1,427
Pakistan	1,247	1,085
Sudan	662	81
Vietnam	996	694
Zambia 2013	720	364
Zambia 2019	601	180

Note: Number of observations for WB Enterprise and Innovation Surveys.

It is important to stress that these are the maximum number of observations. Not every firm answered every question, often leading to lower numbers of observations. The respondents did either not know the answer, it did not apply to them or they did not want to answer.

In order to disaggregate the results, sub-groups are used. They include priority sectors, foreign vs. domestically owned firms, large firms vs. small and medium (SME) firms, as well as exporters vs. non-exporters. Whenever we present shares in tables of Block 3, these are shares in terms of the subgroup. Priority sectors are defined in Table 5; a firm is considered foreign owned, if the share of foreign ownership is above 50%; large firms have 100 or more employees; exporters are all firms that directly or indirectly export part or all of their production. Table 42 reports the coverage across manufacturing sectors.

Table 42 Manufacturing sector coverage, WB Enterprise and Innovation Surveys

	Processed food	Textiles Leather	Wood	Non-met. minerals	Metals	Chem.	MHT (28M-)
Egypt, Arab Rep.	252	541	78	245	181	294	139
Ghana	57	35	21	24	80	51	7
India	651	912	144	582	1,256	1,272	1,901
Nigeria	274	239	57	196	194	65	35
Pakistan	234	296	16	146	79	151	103
Sudan	21	6	0	8	7	21	15
Vietnam	130	178	21	133	112	37	48
Zambia 2013	62	43	19	37	41	49	27
Zambia 2019	76	15	10	9	15	20	5

Note: Number of observations for WB Enterprise and Innovation Surveys. Numbers for non-priority sectors are not listed.

[61] There were no Innovation Surveys conducted in Egypt and Vietnam.

Table 43 reports coverage across owner structure, firm size and exporter status for manufacturing firms.

Table 43 Coverage of other dimensions, WB Enterprise and Innovation Surveys

	Dom. owned	Foreign owned	Large firms	SMEs	Exporters	Non-exp.
Egypt, Arab Rep.	1,892	123	492	1,523	444	1,571
Ghana	317	60	38	339	95	282
India	7,142	21	1,824	5,339	1,310	5,853
Nigeria	1,402	25	114	1,313	346	1,069
Pakistan	1,080	4	240	845	200	885
Sudan	80	1	13	68	8	73
Vietnam	631	63	212	482	253	441
Zambia 2013	289	75	34	330	62	302
Zambia 2019	134	46	45	135	43	137

Note: Number of observations for WB Enterprise and Innovation Surveys.

For some questions, due to low answering rates, subgroups will drop out of the analysis. Questions (codes) from the Enterprise and Innovation Surveys used in all parts of this report are listed in Table 44.

Table 44 Questions from the Enterprise and Innovation Surveys

Code	Question
a1	Country
a6a	Firm size (3-4 categories), used to create group large firms vs. SMEs
A2f6	What was the average nominal annual interest rate on this most recent line of credit or loan? (2013 only)
A2f1	Average annual interest rate of the most recently approved overdraft facility (2013 only)
d1a2	ISIC Rev 3.1 4-digit code that best applies to the establishment's main activity or product 2-digit were used to map to 'priority sectors'
b2a	What percentage of this firm is owned by private domestic individuals, companies or organizations?
b2b	What percentage of this firm is owned by private foreign individuals, companies or organizations?
b2c	What percentage of this firm is owned by government or state?
b4	Amongst the owners of the firm, are there any females? (Y/N)
b7a	Is the Top Manager female? (Y/N)
c6	Over fiscal year 2011, did this establishment experience power outages? (Y/N)
c7	In a typical month, over fiscal year 2011, how many power outages did this establishment experience?
c8	How long did these power outages last on average?
c9a	Please estimate the losses that resulted from power outages either as a percentage of total annual sales.
c10	Over the course of fiscal year 2011, did this establishment own or share a generator? (Y/N)
c11	In fiscal year 2011, what percentage of this establishment's electricity came from a generator or generators that the establishment owned or shared?
c15	Over fiscal year 2011, did this establishment experience insufficient water supply for production?
c16	In a typical month, over fiscal year 2011, how many incidents of insufficient water supply did this establishment experience?
c17	How long did these incidents of insufficient water supply last on average?
c30a	To what degree is Electricity an obstacle to the current operations of this establishment?
c30b	To what degree is Telecommunications an obstacle to the current operations of this establishment?
d3a	In fiscal year 2011, what percentage of this establishment's sales were national sales?
d3b	In fiscal year 2011, what percentage of this establishment's sales were indirect exports (sold domestically to third parties that exports products)? Used to create group exporters vs. non-exporters.
d3c	In fiscal year 2011, what percentage of this establishment's sales were direct exports? Used to create group exporters vs. non-exporters.
d12a	In fiscal year 2011, as a proportion of all material inputs or supplies purchased that year, what percentage of this establishment's material inputs, or supplies were material inputs or supplies of domestic origin?

d12b	In fiscal year 2011, as a proportion of all material inputs or supplies purchased that year, what percentage of this establishment's material inputs, or supplies were material inputs or supplies of foreign origin?
d30a	To what degree is Transport an obstacle to the current operations of this establishment?
d30b	To what degree is Customs and Trade Regulation an obstacle to the current operations of this establishment?
e30	To what degree are Practices of Competitors in the Informal Sector an obstacle to the current operations of this establishment?
g2	Over the last two years, did this establishment submit an application to obtain a construction-related permit? (Y/N)
g3	In reference to that application for a construction-related permit, approximately how many days did it take to obtain it from the day of the application to the day the permit was granted?
g30a	To what degree is Access to Land an obstacle to the current operations of this establishment?
ha1	Currently, what percentage of this establishment's employees regularly uses computers in their jobs, including management?
ha6	Currently, does this establishment have an internet connection?
hb1	From fiscal year 2010 thru 2012, did this establishment introduce any innovative product or service? (Y/N)
hb2	From fiscal year 2010 thru 2012, how many innovative products or services did this establishment introduce?
hb10	Do any of the following describe why this establishment introduced this main innovative product: (7 categories)
hb13	Was the main innovative product or service developed entirely by this establishment?
hb15	Was the main innovative product or service developed in cooperation with any of the following? (6 categories)
hb16	Were employees hired specifically for the purpose of developing the main innovative product or service? (Y/N)
hb17	From fiscal year 2010 thru 2012, as a consequence of introducing any innovative product or service, did the number of skilled workers employed by the establishment increase, decrease or remain the same?
hb18	From fiscal year 2010 thru 2012, as a consequence of introducing any innovative product or service, did the number of unskilled workers employed by the establishment increase, decrease or remain the same?
hb19a	From fiscal year 2010 thru 2012, did this establishment attempt to develop an innovative product or service that was abandoned or suspended before completion?
hc1	From fiscal year 2010 thru 2012, did this establishment introduce any innovative methods of manufacturing products or offering services? (Y/N)
hc2	From fiscal year 2010 thru 2012, did this establishment introduce any innovative logistics, delivery, or distribution methods for inputs, products, or services? (Y/N)
hc3	From fiscal year 2010 thru 2012, did this establishment introduce any innovative supporting activity for processes, such as maintenance systems or operations for purchasing, accounting, or computing? (Y/N)
hc8	Does the most important innovative process … (4 categories)
hc10	Do any of the following describe why this establishment introduced the most important innovative process? (8 categories)
hc13	Was the most important innovative process developed entirely by this establishment? (Y/N)
hc16	Were employees hired specifically for the purpose of developing the most important innovative process? (Y/N)
hc17	From fiscal year 2010 thru 2012, as a consequence of introducing any innovative processes, did the number of skilled workers employed by the establishment increase, decrease or remain the same?
hc18	From fiscal year 2010 thru 2012, as a consequence of introducing any innovative processes, did the number of unskilled workers employed by the establishment increase, decrease or remain the same?
hd9a	In fiscal year 2012 what best describes what happened at this establishment when a problem arose in the production process, such as a quality defect or machinery or equipment break-downs?
hf1a	From fiscal year 2010 thru 2012 did this establishment conduct internal R&D? (Internal R&D is defined as creative work undertaken to increase knowledge for developing innovative products and processes.) (Y/N)
hf2a	From fiscal year 2010 thru 2012 did this establishment conduct external R&D? (External R&D is defined as creative work, undertaken by other enterprises, public or private research organizations, which was paid for by this establishment.) (Y/N)
hf3a	From fiscal year 2010 thru 2012 did this establishment provide formal training to any of its employees specifically for the development and/or introduction of innovative products or services and processes? (Y/N)
hf6	Thinking about innovation, which of the following is the most important source of information or ideas for any innovation activity for this establishment? (12 categories)
hf7	From fiscal year 2010 thru 2012, did this establishment fund its innovation activities from any of the following sources: (5 categories)
hf8	Between fiscal years 2010 and 2012, did this establishment receive any non-financial support from the government for innovation-related activities? (This includes training in the use of innovation equipment, assistance in research and product development, and assistance and training for marketing innovations) (Y/N)
i30	To what degree is Crime, Theft and Disorder an obstacle to the current operations of this establishment?
j2	In a typical week over the last year, what percentage of total senior management's time was spent on dealing with requirements imposed by government regulations?

	(By senior management I mean managers, directors, and officers above direct supervisors of production or sales workers. Some examples of government regulations are taxes, customs, labor regulations, licensing and registration, including dealings with officials and completing forms)
j30 h30	To what degree is/are [INSERT OPTION] an obstacle to the current operations of this establishment? Options: Tax rates, Tax administration, Business licensing and permits, Political Instability, Corruption, Courts
k17	What was the main reason why this establishment did not apply for any line of credit or loan?
k20a	Referring only to the most recent application for a line of credit or loan, what was the outcome of that application?
k30	To what degree is Access to Finance an obstacle to the current operations of this establishment?
KENk26	How many applications for loans or lines of credit were submitted in fiscal year 2011? (2013 only)
KENk27	Of these applications for loans or lines of credit submitted in fiscal year 2011, how many of those applications were rejected? (2013 only)
KENk28	What was the most common reason given by the lender for those rejections for applications for a loan or line of credit? (2013 only, 7 possible answers)
l1	At the end of fiscal year 2011, how many permanent, full-time individuals worked in this establishment? Please include all employees and managers (Permanent, full-time employees are defined as all paid employees that are contracted for a term of one or more fiscal years and/or have a guaranteed renewal of their employment contract and that work a full shift) *Used whenever we calculated shares in total employment by firm.*
l4	At the end of fiscal year 2011, how many permanent, full-time individuals working in this establishment were skilled/unskilled?
l5	At the end of fiscal year 2011, how many permanent full-time individuals working in this establishment in the following categories were female? (permanent full-time production workers/permanent full-time non-production workers)
l30a	To what degree are Labor Regulations an obstacle to the current operations of this establishment?
l30b	To what degree is an Inadequately Educated Workforce an obstacle to the current operations of this establishment?
MMs1	In its current operations, does this establishment use mobile money for any of its financial transactions? (Y/N) (2013 only)
MMs11	Why does this establishment not use mobile money for financial transactions? (6 possible answers) (2013 only)
n2a	Total annual cost of labor including wages, salaries, bonuses, social security payments.
n2b	Total annual costs of electricity.
n2ra	Total rental cost of machinery, vehicles and equipment.
n2rb	Total rental cost of land and buildings. (2013 only)
n2e	Total annual cost of raw materials and intermediate goods used in production.
n2f	Total annual costs of fuel. (2013 only)
n2j	Other cost of production not included above. (2013 only)
u2	What was the primary focus of the new rule or regulation? (taxation) If there were several, please refer to the main rule or regulation? [In the past three years, were any new rules or regulations enacted without prior notice or consultation?] (2019 only)
u5	What was the primary focus of the rule or regulation for which it was difficult to find information? (taxation) If there were several, please refer to the main rule or regulation. [In the past three years, did this establishment encounter difficulty in finding information on existing rules and regulations?] (2019 only)
u11	What was the primary focus of the rule or regulation? If there were several, please refer to the main rule or regulation. (taxation) [In the past three years, did this establishment face a situation in which rules or regulations were applied in a way that was different from how it was expected?] (2019 only)
u14	What was the primary focus of this rule or regulation? If there were several, please refer to the main rule or regulation. (taxation) [In the past three years, did this establishment deal with any rules or regulations for which there was no effective way to contest how the rule or regulation was applied?] (2019 only)
ZAMf1	Which of the following constitute the main reason for this establishment to operate below its full capacity? (9 possible answers, 2019 only)
ZAMd21	Currently, which of the following constitute the main obstacle to expansion of this establishment's sales? (7 possible answers, 2019 only)

Note: Not all questions are available in all surveys. WB surveys have a different focus in different years. For example, most finance questions are only available in the Zambian World Bank Enterprise Survey 2013.

E3: The World Bank Skills Survey

The World Bank Group offers a set of surveys titled 'STEP Skill Measurement Program'. Unfortunately, Zambia is not covered in this set of surveys. Instead, there is the World Bank Skill Survey that uses the

same format as the Enterprise and Innovation surveys. Unfortunately, it only covers Zambia (2016) and Tanzania (2015). Table 45 reports country and sector coverage for the skill surveys.

Table 45 Country and sector coverage, WB Skills Surveys

Country	Total	Manufacturing	Processed food	Textiles Leather	Metals
Tanzania	424	208	52	44	49
Zambia	350	129	51	21	28

Note: Number of observations for WB Skill Surveys. The Skill Survey only cover 3 of the priority sectors.

Table 46 reports coverage across owner structure, firm size and exporter status for manufacturing firms.

Table 46 Coverage of other dimensions, WB Skill Surveys

Country	Dom. owned	Foreign owned	Large firms	SMEs	Exporters	Non-exp.
Tanzania	200	8	0	208	26	182
Zambia	126	3	16	113	12	117

Note: Number of observations for WB Skill Surveys.

The low numbers for some subgroups indicate why we typically cannot use information on foreign owned firms and sometimes neither on large firms nor exporters in the Skill Survey.

Questions (codes) from the Skill Surveys used in all parts of this report are:

Table 47 Questions from the Skill Surveys

Code	Question
a1	Country
a6a	Firm size (3-4 categories), used to create group large firms vs. SMEs
d1a2	ISIC Rev 3.1 4-digit code that best applies to the establishment's main activity or product 2-digit were used to map to 'priority sectors'
b2a	What percentage of this firm is owned by private domestic individuals, companies or organizations?
b2b	What percentage of this firm is owned by private foreign individuals, companies or organizations?
b2c	What percentage of this firm is owned by government or state?
d3a	In fiscal year 2011, what percentage of this establishment's sales were national sales?
d3b	In fiscal year 2011, what percentage of this establishment's sales were indirect exports (sold domestically to third parties that exports products)? Used to create group exporters vs. non-exporters.
d3c	In fiscal year 2011, what percentage of this establishment's sales were direct exports? Used to create group exporters vs. non-exporters.
l1	At the end of the last complete fiscal year, how many permanent, full-time individuals worked in this establishment? Please include all employees and managers (Permanent, full-time employees are defined as all paid employees that are employed for a term of one or more fiscal years and/or have a guaranteed renewal of their employment and work a full shift) Used whenever we calculated shares in total employment by firm for questions from the Skill surveys.
l4	Currently, what percentage of the full-time, permanent workers of this establishment have completed the following as their highest level of education? (Primary, Lower-secondary, Upper-secondary, Higher (Tertiary))
l7	At the end of the last completed fiscal year, how many permanent, full-time individuals working in this establishment were in the following categories? (Managers, Professionals, Technicians and Associate Professionals, Clerical Support workers, Service and sales workers, Plant and machine operators and assemblers, Others)
l8	At the end of the last completed fiscal year, how many foreign permanent, full-time individuals working in this establishment were of the following category? (Managers, Professionals, Technicians and Associate Professionals, Clerical Support workers, Service and sales workers, Plant and machine operators and assemblers, Others)
l10	How many of these vacancies in this establishment were in the following categories? How many of these vacancies were filled? What was the average number of weeks required to fill these vacancies? (Managers, Professionals, Technicians and Associate Professionals, Clerical Support workers, Service and sales workers, Plant and machine operators and assemblers, Others)

I11	Over the last two completed fiscal years, did this establishment encounter the following problems when trying to hire workers? (5 categories)
I12	By looking at card XX, can you tell me among the following skills which are the three most important type of skills for deciding whether to hire an employee? (9 skills)
I16	How do you rate the level of skills of the establishment's permanent employees compared to what the establishment needs for the following types of skills? (9 skills, below required, as required, above required)
I17	Over the last two fiscal years, due to employee shortages or skills gaps of the workforce, did this establishment experience the following difficulties? (5 categories)
I18a	Over the past two fiscal years, did this establishment conduct any (beyond "on the job") formal training programs in-house or outside the establishment's premises for its permanent, full-time employees? (Y/N)
I19	What percent of this establishment's permanent full time employees received formal in-house training?
I20	Who was the main training provider of the in-house training? (5 categories)
I23	Who was the main training provider of the outside training? (5 categories)
I26	What was the MAIN reason why this establishment did not conduct any formal training programs for its permanent full-time employees? (5 categories)
I27	In the last completed fiscal year, how many full-time permanent employees did this establishment employ for each category? (Engineering Professionals, Engineering Technicians, Certified accountants and auditors, Bookkeepers & technician accountants, Architects, Lawyers, IT Professionals, IT technicians & associate professionals)
I30b	To what degree is an Inadequately Educated Workforce an obstacle to the current operations of this establishment?

Note: Some question codes that are common in both Enterprise and Skill Survey do not reflect the same question.

E4: Caveats of the analysis

As with all quantitative analyses, the present study also suffers from some drawbacks that have to be kept in mind. First, it is based solely on answers from firm-level interviews and we have to trust the answers. For some questions, the response rate is very low, either because firms did not know, the question did not apply to them or they presumably did not want to answer. We must keep the low numbers of observations in mind, in order not to over interpret some of the findings. Additionally, we cleaned the data from obvious mistakes such as unrealistic outliers.

The World Bank surveys do not cover some sectors, notably the mining sector that is very important to Zambia. This means, when we talk about non-manufacturing, we mean mainly construction, hotels and restaurants, real estate, transport as well as wholesale and retail trade.

The strength of this part is the use of micro data on the firm-level providing a host of information otherwise hidden in the aggregate. The important strategic Zambian documents relevant for industrialization discuss a broad range of issues but not all of them are covered in the World Bank surveys. This means that few topics are not covered in the present firm-level part of the study despite their potential importance.

The analysis is based entirely on descriptive statistics and does not replace a more thorough econometric study that could take more dimensions into account simultaneously and would potentially uncover conditional distributions. However, such an exercise would also suffer from the low number of observation (per subgroup).

The most recent Zambian Enterprise Survey was release shortly before the release of this document (May 2020). Unfortunately, it covers less manufacturing firms than the survey in 2013. The newest Skill Survey is from 2016, the Innovation survey from 2013, with some of the questions referring to issues in 2011 or 2012. This means, not all results based on the surveys do necessarily reflect to most recent situation in all

topics. Where possible, they have to be put into perspective using more recent, qualitative information. For this, we also interviewed stakeholders in Zambia in April and May 2020. Their views are included in the text.

F. Additional information on the bottleneck analysis

F.1: Finance

Table 48 confirms the information from consultations. Interest rates were high already in 2013. Textile producers had to pay 35% p.a. on average on their most recent credit. Refer to Box 3 for more context on interest rates.

Table 48 Interest rates on most recent financial applications

	Mnf	Non Mnf	Proc. food	Textile Leather	Wood	Non-met. minerals	Metals	Chem.	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
Interest rate most recent credit	18.2	15.5	16.9	35.0	17.0	22.0	20.1	16.3	14.7	18.7	15.9	14.9	19.2	16.4	18.6
Interest rate most recent overdraft facility	16.0	19.9	16.4	12.5	6.0	16.4	20.2	14.1	15.6	15.9	16.4	18.8	15.3	15.9	16.1

Note: Average interest rates firms had to pay on their most recent line of credit or overdraft facility.
Data Source: Zambia World Bank Enterprise Survey 2013.

While the majority of data analysis is based on descriptive statistics (e.g. average shares), there might be additional value by looking at potential connections between obstacles. Table 49 shows that the probability of firms owning or sharing a fuel-powered generator is (i) higher if they also reported Electricity as very severe or major obstacle and (ii) lower if they also reported Access to Finance as very severe or major obstacle.[62] Both estimations are based on data for all benchmark LMI countries (2013 data for Zambia).

Table 49 Linear probability model – use of a power generator

Estimation results				
Dependent variable: Dummy (use or share power generator)				
	Estimate	Std. Error	t value	Pr(>|t|)
Constant	0.693***	0.013	52.11	< 2E-16
Reported 'Access To Finance' as very severe or major obstacle	-0.030***	0.007	-4.49	7.31E-06
Reported 'Electricity' as very severe or major obstacle	0.166***	0.006	26.61	< 2E-16
Country Dummies	Yes			
Industry Dummies	Yes			
Firm Size Dummies	Yes			
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 0.4486 on 26317 degrees of freedom				
Multiple R-squared: 0.194, Adjusted R-squared: 0.193				
F-statistic: 301.2 on 21 and 26317 DF, p-value: < 2.2e-16				

[62] Estimations are based on manufacturing firm-level observations. Zambian values are taken from the most recent survey (2019).

As land can be used as collateral, a lack of land can mean worse access to finance. Table 50 shows that firms that reported Access to Finance as problem show a higher probability of also naming Access to Land as problem.

Table 50 Linear probability model - land and finance.

Estimation results				
Dependent variable: Dummy ('Access to Land' as very severe or major obstacle)				
	Estimate	Std. Error	t value	Pr(>|t|)
Constant	0.475***	0.012	37.07	< 2E-16
Reported 'Access To Finance' as very severe or major obstacle	0.164 ***	0.006	24.61	< 2E-16
Country Dummies	Yes			
Industry Dummies	Yes			
Firm Size Dummies	Yes			
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 0.4432 on 26426 degrees of freedom				
Multiple R-squared: 0.159, Adjusted R-squared: 0.158				
F-statistic: 249.2 on 20 and 26426 DF, p-value: < 2.2e-16				

F2: Innovation

The World Bank Innovation Survey asks many questions relating to innovation activities, main sources for ideas and funding, etc. Here are additional tables detailing this information.

Table 51 and

Table 52 show the share of firms that report different reasons for their product or process innovation respectively.

Table 51 Reasons for innovating products/services

Product innovation	Mnf	Non Mnf	Mnf LMI	Proc. food	Textiles Learher	Wood	Non-met. minerals	Metals	Chem.	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
Comply with regulations or standards	49	53	53	42	14	56	60	56	83	60	48	55	69	47	57	48
Decrease cost	72	65	41	63	57	89	73	81	72	80	72	74	56	74	86	69
Deal with a decrease in the demand for other products or service	41	48	44	32	43	44	40	38	56	40	42	39	44	41	46	40
Extend the range of products or service	86	85	91	89	90	100	73	88	1	70	85	90	94	86	89	86
Offer products or service already offered by competitors	84	78	73	95	86	100	80	94	61	80	85	77	75	85	82	84
Open up new markets or increase market share	83	92	84	89	81	78	73	75	78	90	85	77	88	83	93	81
Replace a product or service	52	43	32	32	52	33	67	44	61	90	53	48	38	54	64	50

Note: Share (%) of firms reporting the following reasons for introducing their latest product or service innovation.
Data Source: World Bank Innovation Survey Zambia 2013 (except column LMI).

Table 52 Reasons for innovating processes

Process innovation	Mnf	Non Mnf	Mnf LMI	Proc. food	Textiles Leather	Wood	Non-met. minerals	Metals	Chem.	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
Comply with regulations or standards	27	27	49	31	32	17	21	18	27	27	27	29	14	29	43	24
Decrease cost	56	59	49	45	68	50	42	59	65	73	55	61	52	57	74	53
Increase the flexibility of production	89	85	64	97	96	58	84	77	100	87	89	88	86	89	94	88
Increase the total production	91	88	67	100	92	83	89	77	92	87	92	88	95	9	97	89
Increase the quality	93	87	82	93	8	100	95	91	100	100	92	98	95	93	97	92
Increase the speed of delivery	79	84	52	97	92	50	68	68	62	80	78	80	71	79	77	79
Increase the speed of production	85	84	68	86	96	67	89	68	96	80	87	78	95	84	91	84
Reduce waste or errors (defect rate or rejection rate)	35	39	60	24	40	33	21	27	38	53	33	44	29	36	54	31

Note: Share (%) of firms reporting the following reasons for introducing their latest process innovation.
Data Source: World Bank Innovation Survey Zambia 2013 (except column LMI).

Table 53 lists shares of firms that report different properties of their most recent innovation. Response rates were usually larger than 50%. Almost 90% of innovations were done to automate parts or the entire production process.

Table 53 Properties of newest innovation

	Mnf.	Non Mnf	Mnf LMI	Proc. food	Textile Leather	Wood	Non-met. minerals	Metals	Chem.	MHT (28M-)	Dom. Owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
Adapt a technology or method previously used by this establishment?	51	59	34	34	52	92	47	59	54	47	52	49	67	50	54	51
Automate manual processes,partially or fully?	88	82	65	86	76	100	84	95	85	87	87	90	86	88	86	88
Introduce a new technology or method?	82	80	67	79	64	92	84	86	92	93	81	85	86	82	86	81
Use a more efficient technology or method already used by this establishment	61	67	55	48	56	92	58	64	58	67	61	61	67	60	66	60

Note: Share (%) of firms that responded to questions about their latest process innovation activity.
Data Source: World Bank Innovation Survey Zambia 2013 (except column LMI).

The share of firms that developed their innovation entirely in-house is reported in Table 54**.** It shows that most innovation in Zambian manufacturing is done entirely in-house and not in cooperation with other partners.

Table 54 Innovation developed entirely in-house.

In-house developed	Mnf.	Non Mnf	Mnf LMI	Proc. food	Textiles Leather	Wood	Non-met. minerals	Metals	Chem.	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
products	76	76	85	95	67	89	73	81	67	81	76	77	81	75	79	75
processes	79	85	71	79	88	83	79	77	73	81	80	73	90	77	74	80

Note: Share (%) of firms reporting that their product or process innovation was done entirely in-house.
Data Source: World Bank Innovation Survey Zambia 2013 (except column LMI).

Asked about their main source of innovation idea, Table 55 shows the average share of firms across sources. Innovation ideas seem to come through contact with customers and suppliers as well as by what already exists in the marketplace.

Table 55 Source of innovation ideas

Most important source of information or ideas for innovation	Mnf.	Non Mnf	Mnf LMI	Proc. food	Textile Leather	Wood	Non-met. minerals	Metals	Chem.	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SME	Expo.	Non-exp.
Business associations and conferences/ exhibits	7	6	8	5	3	NA	3	20	10	6	7	8	5	7	14	5
Consultancy firms	2	4	6	2	3	NA	NA	3	NA	NA	1	2	NA	2	2	1
Customer feedback	41	50	25	60	61	60	45	20	23	31	43	33	27	42	33	43
Government ministries or programs	2	0	2	NA	NA	NA	NA	NA	3	NA	1	2	NA	2	2	1
In-house	6	6	14	2	9	7	3	7	13	12	6	6	9	6	7	6
Internet	5	6	4	10	3	NA	3	3	10	6	5	6	23	3	12	4
Knowledge from parent or another firm	8	7	5	5	6	NA	16	3	10	6	9	8	9	8	5	9
Products or services available in the market	14	9	15	5	6	20	16	13	13	12	15	12	5	15	7	15
Professional journals and trade publications	3	1	3	2	3	NA	3	7	NA	12	2	6	5	3	NA	4
Recent hires from other firms	2	1	2	NA	NA	NA	NA	3	7	NA	2	2	NA	2	5	1
Suppliers	9	9	15	2	3	13	10	20	10	12	9	10	14	8	9	9
Universities and research institutes	2	1	1	5	3	NA	NA	NA	NA	NA	0	8	5	2	5	1

Note: Share (%) of firms that reported the following as their main source of idea for an innovation.
Data Source: World Bank Innovation Survey Zambia 2013 (except column LMI).

F3: Access to land

Access to land is a topic with many dimensions. The Enterprise Survey asked if firms applied for construction permits and how long (days) this process took them (Table 56).

Table 56 Bottleneck: Access to Land

	Mnf. 2019 2013	Non Mnf	Mnf. LMI	Proc. food	Textiles Leather	Wood	Non-met. minerals	Metals	Chem	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non exp.
Share applic.	20 17	17	6	16	12	5	30	17	20	26	15	27	38	15	23	16
Length applic.	30.6 55.5	59	36.5	110.1	61.6	14	35	49.1	70.4	52.3	51.7	62	116.8	35.7	50.3	56.8

Note: Share (%) of firms that applied for a construction permit and the average length in days it took for completion.
Data Source: World Bank Enterprise Surveys. Zambia 2013 for all columns except LMI, Zambia 2019 added to col. 1 (manufacturing).

F4: Skills and Labor Force

Table 57 reports the average share of employees that have reached at least the stated formal level of education. The numbers are mentioned in the main text.

Table 57 Formal education

Highest education	Mnf	Non Mnf	Mnf TNZ	Proc. food	Textiles Leather	Metals	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.

Tertiary	29	34	11	25	39	27	28	40	33	28	29	29
Lower secondary	18	15	27	19	13	18	19	10	17	19	19	18
Upper secondary	20	15	45	22	14	20	20	13	18	20	21	20
Primary	33	35	17	33	34	36	33	37	32	33	31	33

Note: Average share (%) of employees that completed specific level of formal education.
Data Source: World Bank Skills Survey Zambia 2016 and Tanzania 2015.

Table 58 lists the most desired skills when hiring. Two of the top three skills are soft skills (interpersonal and communication skills as well as work ethic), one is technical (non-IT) skills. Foreign owned firms and metal producers show relatively high interest in technical (non-IT) skills.

Table 58 Most desired skills when hiring

Skill	Mnf	Non Mnf	Mnf TNZ	Proc. food	Textiles Leather	Metals	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non-exp.
Computer skills / General IT skills	2	5	2	NA	NA	4	2	NA	NA	2	NA	2
Critical thinking skills	9	6	5	10	10	7	9	NA	NA	10	8	9
English skills	1	2	2	NA	NA	NA	1	NA	NA	1	NA	1
Interpersonal and communication skills	34	38	38	43	24	32	34	33	38	34	42	33
Numeracy Skills	2	0	NA	2	5	NA	2	NA	NA	2	NA	2
Problem solving skills	7	6	2	4	10	7	7	NA	12	6	8	7
Technical skills, other than computers / vocational, job-specific skills	20	17	30	10	33	29	20	33	12	21	17	21
Work ethic	19	20	20	20	19	18	19	33	31	18	8	21
Writing skills	6	5	NA	12	NA	4	6	NA	6	6	17	5

Note: Share (%) of firms that identified a skill as most important when hiring.
Data source: World Bank Skill Survey Zambia 2016 and Tanzania 2015.

Firms used training with the specific goal to help innovation activities (Table 59). It shows that only 25% of Zambian manufacturing firms conduct training related to innovation activities compared to 39% of LMI country firms.

Table 59 Training for innovation activities

	Mnf	Non-Mnf	Mnf. LMI	Proc. food	Textiles Leather	Wood	Non-met. minerals	Metals	Chemi.	Dom. owned	Foreign owned	Large firms	SMEs	Exporter	Non-Exporter
Conducted training for innovation	25	23	39	22	6	27	23	23	37	27	15	27	24	26	24

Note: Share (%) of firms that conducted some form of training specifically for innovation activities.
Data Source: World Bank Innovation Survey Zambia 2013 (except column LMI).

Table 60 reports the average share of labor costs in total costs of firms. 39% of total costs in manufacturing, are labor costs. This is almost double the LMI country average.

Table 60 Wage bill

	Mnf	Non Mnf	Mnf LMI	Proc. Food	Textiles Leather	Wood	Non-met. minerals	Metals	Chem.	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Export.	Non-exp.
Wage bill	39	49	23	36	39	35	42	44	34	34	39	41	32	40	38	39

Note: Average wage bill (cost of labor) as share (%) of total costs.

Data Source: World Bank Enterprise Survey Zambia 2013 (except column LMI).

While the Enterprise Survey asked if an inadequately skilled labor force represents an obstacle in 2013 and 2019 (Table 14), the Skill Survey asked it as well in 2016 (

Table 61).

Table 61 Bottleneck: Inadequately skilled labour force

	Mnf	NonMnf	Mnf TNZ	Proc. food	Textile Leather	Metals	Dom. owned	Large firms	SMEs	Non-exp.
Inadequate skilled labour force	10	21	12	6	10	22	10	6	10	11

Note: Share (%) of firms that view an inadequately skilled labor force as very severe or major obstacle.
Data Source: World Bank Skill Survey Zambia 2016 and Tanzania 2015.

F5: Detailed 2019 results

All tables that are based on the World Bank Enterprise Surveys include 2019 values for the manufacturing sector as a whole. For completeness, the following tables show the detailed 2019 results. However, it has to be stressed that these are in part based on relatively few observations (see Table 41 and Table 42 for the number of observations) for the manufacturing sector and thus must be interpreted with caution.

Table 62 corresponds to Table 14 in listing the share (%) of firms that report different topics as very severe or major obstacles to their operation. The benchmark values (column LMI) are still from the same data as before.

Table 62 Bottlenecks 2019

	Mnf	Non-Mnf	Mnf. LMI	Proc. food	Textile Leather	Wood	Non-met. miner	Metals	Chem	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Export.	Non-exp
Access finance	40	37	19	30	53	60	44	34	50	40	44	31	28	45	38	42
Access to land	20	25	14	11	33	50	22	13	30	20	22	16	13	22	19	21
Business lic. and permits	15	21	13	15	13	20	22	NA	10	20	17	11	11	17	16	15
Corruption	21	22	44	17	33	30	33	7	30	20	20	24	15	23	21	22
Courts	17	24	10	17	40	10	NA	20	20	20	17	17	15	17	21	16
Crime	7	13	11	10	NA	NA	11	7	10	NA	8	4	9	7	7	7
Customs	11	25	12	17	7	NA	NA	NA	10	NA	8	17	13	10	21	8
Electricity	65	54	39	72	73	60	55	40	80	40	66	63	62	66	68	65
Inad. skilled labor force	13	8	12	11	7	30	33	20	15	NA	13	13	11	13	10	13
Informal sector	29	27	18	21	53	50	33	14	25	NA	32	32	29	29	156	33
Labor regulation	9	11	13	14	7	20	NA	NA	15	NA	8	8	7	10	12	8
Political instability	18	22	28	22	NA	20	33	20	20	20	17	17	16	20	18	19
Tax admin	18	22	19	20	NA	10	NA	7	40	20	16	16	15	18	18	17
Tax rates	21	16	29	17	13	NA	44	33	25	40	17	17	20	21	19	21
Telecom.	12	17	14	8	20	20	11	13	20	NA	13	13	13	12	10	13

Transportation	NA	NA	7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: Share (%) of firms that stated listed topic as very severe or major obstacle.
Data Source: World Bank Enterprise Surveys. Zambia 2019 for all columns except LMI.

Table 63 corresponds to Table 15 and reports details on the bottleneck electricity, from the share of firms reporting electricity outages, to the average number and length of the outages, as well as the loss that is inflicted. It also reports the share of firms that use a generator and the amount of electricity that comes from this/these generators.

Table 63 Electricity 2019

	Mnf	Non-Mnf	Mnf. LMI	Proc. food	Textiles Leather	Wood	Non-met. minerals.	Metals	Chem	MHT (28M-)	Dom. owned	For. owned	Large firms	SMEs	Export	Non-exp
Experience power outages (%)	86	81	70	89	100	100	78	67	90	60	85	89	93	84	88	85
Number power outages	15.6	13.7	40	17.7	16.5	9.6	23.4	21.5	9.5	18.3	13.7	20.8	17.6	14.9	18.1	14.7
Length power outages	7.2	8.5	4.2	6.9	9.8	6.1	6.1	4.8	8.1	9.3	7.1	7.4	6	7.6	6.2	7.5
Losses (% sales)	27.8	21.8	11.3	21.6	51.4	25.8	16.3	32.8	23.5	16.7	25.8	21.4	20.4	26.3	15.8	27.2
% own or share generator	52	58	53	66	33	30	33	53	40	80	46	67	76	44	67	47
Share (%) of power electricity generator	29	31.7	20.7	32.6	33	30	7.3	9.8	28.4	25	27.2	32.6	30.5	28.1	23.8	31.4

Note: The number of power outages is reported in average occurrences in a typical month, the length of power outages is reported in average hours per outage. Losses due to power outages are reported as average share (%) of total sales. Experience and 'own or share' refer to shares (%) of firms.
Data Source: World Bank Enterprise Surveys. Zambia 2019 for all columns except LMI.

Table 64 updates Table 16 and shows firms experiencing water shortages, their average number and average length.

Table 64 Water 2019

	Mnf	Mnf LMI	Proc. food	Textile Leather	Non-met. minerals	Metals	Chem.	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo	Non-exp.
Experience (%) water shortages	15	7	14	20	12	29	10	25	18	4	9	17	19	14
Number of water shortages	14.5	32.7	10.5	15.7	48	19.3	18.5	3	15.3	4.5	13	14.7	5.3	18.6
Length of water shortages	9.4	10.9	10.9	13.3	3	9	2.5	NA	9	13	8.3	9.6	13	8

Note: Share (%) of firms that experienced water shortages, number of occurrences in a typical month and average length (in hours).
Data Source: World Bank Enterprise Surveys. Zambia 2019 for all columns except LMI.

New numbers on construction permits are given in Table 65 which corresponds to Table 56.

Table 65 Construction permits 2019

	Mnf.	Non Mnf	Mnf. LMI	Proc. food	Textiles Leather	Wood	Non-met. minerals	Metals	Chem	MHT (28M-)	Dom. owned	Foreign owned	Large firms	SMEs	Expo.	Non exp.

Share applic.	20	19	6	25	20	10	22	7	20	20	19	22	31	16	23	19
Length applic.	30.6	44	36.5	28.9	30	NA	40	7	30	30	28.8	33.6	34.8	27.2	23.4	34.8

Note: Share (%) of firms that applied for a construction permit and the average length in days it took for completion.
Data Source: World Bank Enterprise Surveys. Zambia 2019 for all columns except LMI.

Table 66 updates the information that is presented in Table 27. It lists the average share of female production and non-production workers, the average share of female top managers and the average share of female business owners.

Table 66 Role of women in manufacturing 2019

	Mnf	Non-Mnf	Mnf. LMI	Proc. food	Textile Leather	Wood	Non-met. miner	Metals	Chem	MHT (28M-)	Dom. owned	For. owned	Large firms	SMEs	Export.	Non-exp
Share female prod. workers	23	NA	8	18	47	12	24	28	13	6	25	17	18	25	22	23
Share female non-prod. workers	12	NA	3	13	11	2	22	10	8	13	11	15	13	11	14	11
Female top managers	13	15	7	12	33	20	NA	7	10	NA	16	4	9	14	9	14
Female owners	43	42	15	42	47	40	22	60	35	40	47	30	38	44	51	40

Data Source: World Bank Enterprise Surveys. Zambia 2019 for all columns except LMI.