1

Framing Structural Transformation in South Africa and Beyond

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1.1 Introduction

Over the course of its democratic history, since 1994, South Africa has struggled to sustain an adequate process of structural transformation, to move from sectors of low to high productivity and complexity, and to upgrade to higher value-added activities within sectors. The structural transformation that has occurred has been discontinuous and uneven. Ongoing premature deindustrialization has negatively affected the long-term performance and potential of the economy. Despite some areas of relative success, overall growth and upgrading in industries have been constrained by low levels of investments. Firms have struggled to build their productive capabilities, diversify their production activities, and develop their domestic supply chains. Given this weakening industrial base, the engagements with global value chains (GVCs) and the emerging technologies of the so-called fourth industrial revolution have been limited, and have generally not delivered the desired outcomes. The imperatives of greater inclusion and environmental sustainability are additional and major cross-cutting challenges within the overall challenge of structural transformation.

Structural transformation is a complex, long-term historical process entailing both structural change in the sectoral composition of an economy and broader societal changes in the productive organizations, institutions, and political economy of a country. Industrial development and structural transformation are intimately linked as the industry-led productive transformation of the economy has been recognized as a critical driver of inclusive and sustainable structural transformation (UNIDO, 2020). Causality runs in both directions, as industrialization both drives and is sustained by broader social, institutional, and political economy changes. And these changes are crucial for delivering sustainable and inclusive outcomes along countries' development journeys.

Structural transformation—industrialization in particular—figures prominently on the international development agenda; for instance, inclusive and sustainable

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industrialization features in the United Nations Sustainable Development Goals (SDGs, 2015–30). The shift from the Millennium Development Goals (MDGs, 2000–15) to the SDGs marks an important turn in the development discourse, which has reintroduced a more holistic notion of 'development as structural transformation', beyond the more limited focus on 'development as poverty reduction' (Andreoni and Chang, 2017). This paradigmatic shift was pushed by the transformational experience of successful late industrializers such as South Korea, as well as the contribution to poverty reduction of China, in particular, as the largest late industrializer.

As a whole, this book examines South Africa as an important case study of the range of challenges that structural transformation presents, as well as locating South Africa's experience in an international context. Detailed analyses of industry groupings and interests in the country reveal the complex set of interlocking country-specific factors which have hampered structural transformation over several decades, but also the emerging productive areas and opportunities for structural transformation. Links between country-specific and global dynamics of change are identified, with a focus on the challenges and opportunities faced by middle-income countries.

In this chapter, a specific analytical perspective on the nature and dynamics of structural transformation is advanced, and a set of interlocking critical factors and dimensions is identified. Framing the contributions that follow in the subsequent chapters of the book, the chapter first engages in a discussion of emerging perspectives on structural transformation. Next is an evaluation of the extent to which South Africa has succeeded or failed in structural transformation, with a focus on particular aspects of industrial performance. This is followed by an exposition of the holistic framework and each of its dimensions, and their relevance in each of the chapters.

1.2 Structural Transformation: Emerging Perspectives

Despite the resurgence of interest in structural transformation, contributions have focused mainly on the impact of changes in the sectoral composition of the economy on increases in cumulative productivity and growth performances. Thus, studies have chiefly focused on a specific set of issues, including: structural change and productivity dynamics within and across sectors (Rodrik, 2008 and 2014; McMillan et al., 2014); the role of endowment structures in the 'new structural economics' and the 'growth identification and facilitation' approach (Lin, 2011; Lin and Monga, 2011; Lin and Wang, 2020); and the macroeconomic link between structural change and economic growth (Ocampo et al., 2009). Some studies have attempted to move one step further in explaining

factors driving structural change. These have mainly focused on different trade-based analyses of diversification in the so-called 'product space' (see for example Hausmann and Rodrik, 2003; Hausmann et al., 2007; Hidalgo and Hausmann, 2009).

Structural transformation is, however, a much more complex process which entails both the recomposition of the economy at the sectoral level *and* broader societal changes in the productive organizations, institutions, and political economy of a country. From this perspective, only by analysing these context-specific micro-dynamics of change and their relationship with the evolving international context can the major factors responsible for structural transformation (or the lack of it) be fully understood. Embracing this complexity, the holistic framework advanced in this volume focuses on four dimensions of structural transformation: learning processes and capabilities development, technological change, economic and power relationships along value chains, and broader political economy dynamics.

These dimensions have been identified starting from the recognition of structural transformation as a historical process in which global and local power dynamics constantly shape the economic structure, as it moves along more or less productive pathways. The relationships between economic actors along value chains and the emergence of different institutional and social configurations are therefore an intrinsic part of structural change. They are both drivers and outcomes of structural transformation. Through these processes, effective employment creation in formal industrial sectors, and the diversification of the economy with a more diffused distribution of organizational power, are key to changing the social and political economy dynamics. These, in turn, reinforce transformation in the economy.

Sector-specificity and the evolving nature of sectors matter too, in that different sectors have different characteristics that are relevant for growth. Several classical contributions (Prebisch, 1950; Hirschman, 1958; Kaldor, 1966) in particular, have regarded the manufacturing sector as having features that accord it a special role as an engine of growth. These include dynamic increasing returns to scale; a high propensity for learning-by-doing; greater scope for technological and organizational capabilities development; tradability and hence importance for balance of payments; strong growth-pulling intersectoral (especially backward) linkages; and its importance as the locale for economy-wide technological progress (Tregenna, 2009 and 2013). However, major technological and organizational changes—digitalization and the vertical disintegration of industries into GVCs—have led to a shift in the 'terrain of the industrial' (Andreoni, 2020). As a result, new activities at the interfaces of agriculture, manufacturing, and services have increasingly shown some of the traditional properties associated with manufacturing that are critical for structural transformation. Indeed, the application of

manufacturing technologies and organizational practices, including the digitalization of production, has meant a blurring of sectoral boundaries, complex evolving industry organizations, and new business models (Cramer and Tregenna, 2020). This includes the growing importance of knowledge-intensive and production-related business services such as design and post-sale services (i.e. servicification), as well as the changing nature of the industrialization of agricultural production.

The state plays a key role in driving and steering this broader economic change (Chang and Rowthorn, 1995; Andreoni and Chang, 2019). Governments and public institutions create new markets and unlock structural coordination problems such as interdependent investments in productive assets and direct demand expansion. Governments also play a moderating role in contested claims on the redistribution of this created value among productive organizations, groups, and segments of the society and polity. Finally, by implementing industrial policies, governments allocate rents among different constituencies, thus shaping the incentive structure of the economy; and by implementing regulatory policies, they address competition and the concentration of power in markets.

Contributions in the fields of institutional economics and the political economy of industrial policy have stressed the political nature of institutions and recognition that the state is a key player in constructing and shaping the institution of the market. The literature on the political economy of development and governance, and the political economy of industrial policy, has expanded significantly over the last decade in particular.[1]

Some of these contributions have also started to link structural transformation to the major global drivers of change, including climate change, digitalization, and the changing terms of trade and production along GVCs. Specifically, going back to the original roots of the GVC research agenda and its relationship with dependency theory (Evans, 1979; Gereffi, 2018), there has been an increasing recognition of the pervasive and multidimensional role of organized power in the economy, in the local and global context, as well as at the interfaces along value chains (Dallas et al., 2019).

Countries that have attained middle-income status, like South Africa, face a number of challenges—in particular, linking up into GVCs while linking back into their domestic economies, and keeping pace with technological change (Andreoni and Tregenna, 2020). These, and developing countries more generally, are looking at industrialization and industrial policy as ways of addressing these challenges, escaping premature deindustrialization, and changing the structural

[1] On the political economy of development and governance leading examples are Chang, 2011; Khan, 2018; Pritchet et al., 2018; and on political economy of industrial policy: Amsden, 1989; Wade, 1990; Chang, 1994; Rodrik, 2004; Stiglitz and Lin, 2013; Mazzucato, 2013; Lee, 2013; Noman and Stiglitz, 2016; Chang and Andreoni, 2020; Oqubay et al., 2020.

and institutional configurations of their economies towards higher-productivity activities. Indeed, structural transformation and industrial policy are returning to the forefront of national policy debates.

The South African case demonstrates the importance of an in-depth industry understanding of productive capabilities and confronting the issues about how to generate sustained industrial and technological upgrading. Middle-income countries are also looking at turning the inclusiveness and sustainability challenges into opportunities for broader societal and environmental transformation. The aspirations of a rising middle class and the broadening of the economic base have the potential to change the political economy of these countries and the functioning of their institutions.

1.3 Structural Transformation in Middle-Income Countries: The Case of South Africa

1.3.1 South Africa's Performance Compared to Other Middle-Income Economies

South Africa offers an important case study of a middle-income country which has, at least in recent years, emphasized the importance of industrial policy in driving structural transformation. This is formally recognized in the National Industrial Policy Framework (2007) and a series of Industrial Policy Action Plans (IPAPs).[2] Black economic empowerment (BEE) policies and competition law have also been important initiatives adopted by the South African government, as they seek to address the entrenched industrial structure and its concentration, as well as its racialized character.

While there have been positive developments in specific sectors, overall, the industrial structure changed relatively little between 1994 and 2019. Fixed investment has remained low, and the economy has exhibited features of premature deindustrialization—instead of the hoped-for broad-based growth that would reverse the legacy of apartheid policies that had focused the economy on a narrow industry and mining base. At the same time, following the liberalization of trade and capital flows in the 1990s, the South African economy has become more open and internationalized. This has been evident in, among other factors, the magnitude of capital flows and the patterns of ownership on the Johannesburg Stock Exchange (JSE). The stock market has expanded to such an extent that the market capitalization in 2019 was equivalent to more than three times the size of

[2] See Chapter 2 for an overview of industrial policy in South Africa.

Table 1.1 Economic performance of South Africa and other middle-income countries

	Brazil	Malaysia	South Africa	Thailand	Turkey	Middle-Income	Upper-Middle Income
GDP (US$ billion), 2019	2,347	399	430	453	1,251	30,557	24,302
GDP growth, 1994–2019	2.3%	5.0%	2.6%	3.4%	4.7%	5.0%	5.0%
GDP per capita, 2019 (US$)	11,122	12,478	7,346	6,503	14,999	5,297	8,510
Industry value-added growth, 1994–2019	1.2%	4.0%	1.3%	3.1%	5.4%	5.2%	5.2%
Manufacturing, value-added growth, 1994–2019	0.4%	5.3%	2.0%	3.6%	5.3%		
Manufacturing, value added (% of GDP), 2019	9.4%	21.5%	11.8%	25.3%	19.0%	18.8%	19.8%
Manufacturing exports (% of merchandise exports), 2018	36.1%	69.5%	46.6%	77.5%	80.9%	65.8%	68.4%
Growth of exports of goods and services, 1994–2019	4.5%	4.7%	2.8%	5.7%	7.3%		
High-tech exports (as % of manuf. exports), 2018	13.0%	52.8%	5.6%	23.3%	2.3%	22.3%	23.5%
Average gross fixed capital formation (% of GDP), 1994–2018	18.5%	26.7%	18.3%	26.6%	25.6%	27.6%	28.1%
Market capitalization of listed domestic companies (as % GDP), 2019	64.5%	110.8%	300.6%	104.7%	24.5%	60.2%	60.2%

Note: Growth rates are all calculated as compound annual average growth rates from data in 2010 constant US$. The gaps in the table are indicators that the World Bank does not calculate for MIC and upper-middle income groups.

Source: World Bank, World Development Indicators.

gross domestic product (GDP) (Table 1.1) even while investment rates in fixed capital stock in the economy remained poor.

South Africa's poor performance overall is evident when compared to its peer group of upper-middle income countries (Table 1.1).[3] While overall, in upper-middle income countries (and the broader MIC group), industry value added led GDP growth over the period 1994–2019, in South Africa, industry growth lagged. South Africa has not been alone in this; for example, Brazil has recorded a similar pattern with industry—and manufacturing as a sub-set of industry—growing slower than GDP. Average investment rates have also been very poor in both countries. South Africa and Brazil have both had a relatively low share of manufactured exports (less than 50 per cent) in total merchandise exports and a very low share of high-tech exports within these manufactured exports—less than 10 per cent in South Africa, compared with Thailand's 23.3 per cent and Malaysia's 52.8 per cent, for example.

The middle-income countries group (as defined by the World Bank, in 2018) comprised highly heterogenous economies accounting together for 75 per cent of the world's population, and as much as 62 per cent of the world's poor. Indeed, this group includes countries which managed to graduate to higher classifications within the broader MIC group in the 2000s, such as Malaysia and Thailand, as well as recent entrants to the middle-income grouping, like Tanzania.

China is a very important country in the middle-income and upper middle-income groupings. When China is excluded from the data, South Africa's performance is not as far from the averages for the country groupings. Excluding China, middle-income countries recorded average GDP growth over the period of 3.7 per cent and industry growth of 3.2 per cent, while upper middle-income countries recorded rates of 3.1 per cent and 2.6 per cent, still notably better than South Africa's average growth rates of 2.6 per cent and 1.3 per cent. The challenges South Africa has faced with poor industrial performance, low levels of investment, and a lack of diversification and weak exports of more sophisticated products is at the lower end, but reflects a number of other countries.

1.3.2 Trends within Manufacturing: A Failure to Diversify

A deeper look into the value-added performance of disaggregated manufacturing sub-sectors reveals the overall stronger performance of upstream resource-based sub-sectors led by coke and refined petroleum products, with basic chemicals and basic iron and steel also performing strongly (Figure 1.1; and see Chapter 2 for a

[3] These countries were selected because they show similar levels of per capita GDP to South Africa in the 1990s and 2000s, are medium-sized in terms of population, and have pursued industrialization strategies.

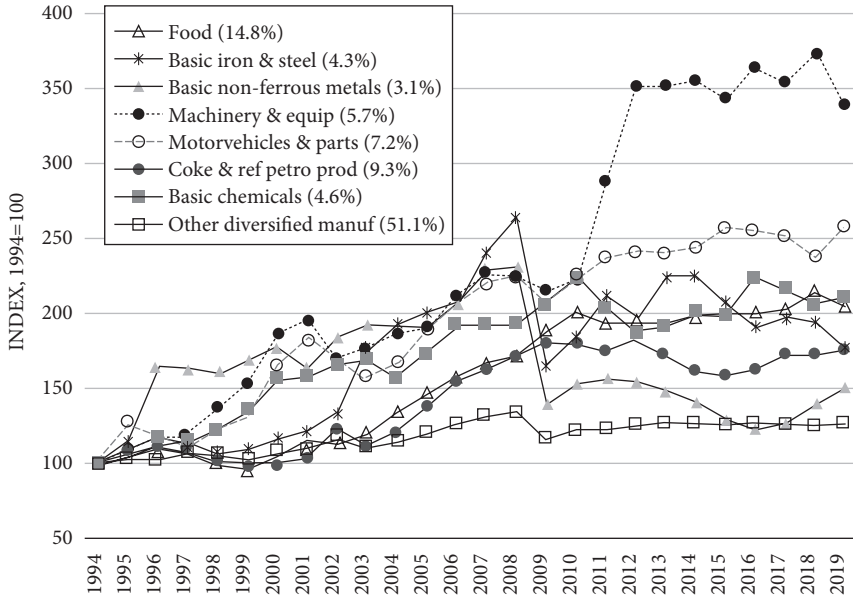

Figure 1.1 Manufacturing value added, changes in selected sub-sectors

Notes: 'Other Diversified Manufacturing' is inclusive of all other manufactured products not separated out in the chart.

Figures in parentheses reflect the shares in manufacturing value added in 2019.

Source: Quantec, authors' calculations.

more detailed analysis of trends).[4] The resource-based sub-sectors, including basic non-ferrous metals (mainly aluminium), grew especially strongly to 2008, reflecting the impact of the global commodities boom. There was also strong growth in value added in machinery and equipment (analysed in Chapter 3) and food products in this period on the back of local demand. The motor vehicle sub-sector stands out as growing value added over the twenty-five years as a result of sustained support through the Motor Industry Development Programme (MIDP, 1995–2012) and the Automotive Production and Development Programme (APDP, 2013–20). However, local content per vehicle declined in the latter period and there are big questions about the strength of local linkages to components (see Chapter 5).

Over the period as a whole, the other diversified manufacturing activities in aggregate (which accounted for more than 50 per cent of total manufacturing

[4] The data considered for sub-sector performance are from Quantec. It is important to note that the Quantec data are not official statistics. They have been compiled including data from Statistics South Africa, with some computations by Quantec. This should be borne in mind, and conclusions relating to the details of any short-run changes should be avoided.

value added in 2019) have performed poorly.[5] There has essentially been a regression since the mid-1990s, away from more diversified and sophisticated manufacturing activities. The continued importance of minerals, basic metals, and isolated islands of other products, including those in motor vehicles, machinery, and fruit, is evident in the map of the product space of South Africa's exports in 2018 (Figure 1.3 below).

There have also been important differences between the resource-based sectors, especially from 2009 onwards—reflecting in part the extent to which they are vulnerable to international price volatility and local energy prices. Sasol,[6] which has dominated the value added in the coke and refined petroleum products sub-sector, has benefited from being vertically integrated back into coal and has obtained natural gas from Mozambique at very low prices (Mondliwa and Roberts, 2017). Sasol has also accounted for the majority of value added in the basic chemicals sub-sector.[7] The division of value added between the refineries and basic chemicals sub-sectors has thus been, to a significant extent, influenced by Sasol's internal transfer-pricing decisions between its refinery and chemicals businesses. Both basic iron and steel and non-ferrous metals have faced the challenges of volatile international prices in terms of inputs and outputs, although basic iron and steel is better integrated back into its key inputs.

As South Africa is a small open economy, a key question for industrial policy has been how to manage the impact of large price swings on the local economy, including support for downstream sectors such as fabricated metal products and plastic products (reported separately in Table 1.2), which have performed very poorly and have seen increased import penetration (see also Chapters 3 and 4). The extensive trade liberalization and international integration from the 1990s increased imports and exports, with imports being more than one-third of domestic demand for total manufactured goods in 2019 (Table 1.2). However, some resource-based sub-sectors such as basic chemicals and basic iron and steel had lower imports in 2019 than in 1994. The effect of the motor industry policies reflected increased exports and lower imports.

Looking at employment data, an absolute decline in employment for manufacturing as a whole is evident, as well as for the other diversified manufacturing grouping (Table 1.2). There have been average increases of more than 1 per cent per annum in only three of the selected sectors—in coke and refined petroleum products (which is highly capital-intensive and employs very few people), as well

[5] Note that not this does not mean that all segments within the other diversified category in Figure 1.1 have performed equally poorly with, for example, consumer goods such as soaps and cosmetics growing local production in line with local demand.

[6] Sasol is a former state-owned firm that is the largest producer of basic chemicals and one of two synthetic fuel producers.

[7] Basic chemicals include fertilizer and polymer chemicals, which obtain their feedstock from refinery by-products and co-products.

as plastic products and machinery and equipment, each of which are key sub-sectors where diversified capabilities could have been built on more (Table 1.2). The decline in employment for the other diversified manufacturing sub-sectors in Table 1.2, which accounted for more than 45 per cent of all manufacturing jobs in 2019, is emblematic of the failure of the economy to transform. In motor vehicles, while there has been good performance in terms of value added and trade, the failure to deepen and diversify local linkages is reflected in no net employment creation in the sub-sector (Chapter 5).

The relationship between manufacturing and services is important for understanding the development of industrial capabilities where design, engineering, and IT services tend to be highly productive and tradable, and can play a key role as a growth driver (McMillan et al., 2014). Notwithstanding the challenges of disaggregating services, in South Africa at an aggregate level, communication, and finance and insurance services have recorded particularly high growth in value added—above 4 per cent per annum (Table 1.3). However, this has not been accompanied by strong employment growth in these sub-sectors. Employment growth has occurred in business services, which includes large numbers of jobs in areas such as outsourced cleaning and security services, as well as in wholesale and retail trade (Tregenna, 2010). In general, the growth of services exports has also been biased towards traditional rather than advanced services (Bhorat et al., 2017). While there has been employment creation in low-wage, low-productivity sub-sectors, the question is why this has not been accompanied by the growth of the more sophisticated services (and higher-skilled employment within them) required for building advanced industrial capabilities and aggregate economic growth. (This is explored further in Chapter 12.)

To assess patterns of continuity and change in the set of productive capabilities in more detail, disaggregated trade data have been assessed, first as shares in total merchandise exports, and then in the more granular main export products discussed in the following sub-section.[8] The clear failure to substantially diversify is evident in South Africa's merchandise exports over time. Perhaps the most striking feature is the lack of any major change in South Africa's export profile over two decades, following some change in the 1990s with the growth of auto exports. Minerals and resource-based industries continued to account for a high proportion of merchandise exports, close to 60 per cent in 2019 (Figure 1.2).[9] Along with growing exports of motor vehicles, machinery and equipment are also notable, growing in importance in the first decade after 1994. All other exports have remained with a share of around 25 per cent.

[8] The focus here is on merchandise trade. While there are also clearly important services exports, such as tourism, these are not well recorded.

[9] This includes minerals resource-based industries of wood, paper and pulp, basic chemicals, and basic metals in Figure 1.2.

Table 1.2 Manufacturing performance: selected sectors

	Total employment			Value added			GFCF, as % value added	Export, as % output		Import, as % domestic demand	
	Growth	Share of total		Growth	Share of total		Average				
	1994–2019	1994	2019	1994–2019	1994	2019	1994–2019	1994	2019	1994	2019
Coke and refined petroleum products	1.6%	1.1%	1.8%	5.0%	4.4%	9.3%	33%	33%	27%	6%	29%
Basic chemicals	0.3%	1.5%	1.8%	3.0%	3.5%	4.6%	56%	20%	46%	58%	37%
Plastics products	1.2%	2.6%	3.9%	1.5%	3.2%	3.0%	18%	3%	17%	11%	34%
Basic iron and steel	–3.3%	5.4%	2.6%	2.3%	3.8%	4.3%	38%	66%	36%	23%	13%
Basic non-ferrous metals	–2.1%	1.8%	1.2%	1.7%	3.2%	3.1%	38%	32%	39%	18%	33%
Metal products excluding machinery	–0.2%	8.1%	8.6%	1.0%	6.9%	5.6%	10%	5%	14%	16%	32%
Machinery and equipment	1.2%	6.3%	9.6%	2.3%	5.2%	5.7%	10%	13%	46%	77%	92%
Motor vehicles, parts and accessories	–0.4%	7.0%	7.1%	3.9%	4.4%	7.2%	17%	10%	49%	50%	46%
Food	0.1%	15.2%	17.5%	2.9%	11.4%	14.8%	25%	8%	11%	11%	13%
Other diversified Manufacturing	–0.9%	51.1%	45.8%	0.9%	54.0%	42.5%	22%				
Total manufacturing	**–0.5%**	**100%**	**100%**	**1.9%**	**100%**	**100%**	23%	14%	26%	26%	35%

Notes: Employment figures include formal and informal employment. Growth rates are all calculated as compound annual average growth rates.

Source: Quantec, authors' calculations.

Table 1.3 Services sector performance

	Total employment			Value added		
	Growth	Share of total		Growth	Share of total	
	(1994–2019)	1994	2019	(1994–2019)	1994	2019
Wholesale and retail trade	3.0%	22.1%	26.6%	3.0%	19.7%	20.4%
Catering and accomm. services	1.5%	5.6%	4.6%	3.2%	1.6%	1.1%
Transport and storage	4.6%	3.0%	5.3%	1.6%	9.7%	9.3%
Communication	–0.5%	2.0%	1.0%	2.9%	1.5%	4.3%
Finance and insurance	1.1%	4.6%	3.4%	7.6%	7.2%	10.1%
Business services	3.5%	15.1%	20.2%	4.5%	18.8%	21.6%
Government, community, and personal services	1.4%	47.7%	38.9%	3.6%	41.6%	33.1%
Total services	3.0%	100.0%	100.0%	3.0%	100%	100%

Notes: Employment figures include formal and informal employment. Growth rates are all calculated as compound annual average growth rates.

Source: Quantec, authors' calculations.

There have been two competing explanations for South Africa's trade performance. First and in line with the analysis above is that the country's approach to trade liberalization reinforced the static comparative advantage in minerals, commodities, and other resource-based manufactures, and exports of diversified manufactured goods have underperformed (Fine and Rustomjee, 1996; Roberts, 2008; Black and Roberts, 2009; Black and Hasson, 2016; Driver, 2019). Second is that there has been a positive relationship between trade liberalization and export performance of manufactured and particularly non-commodity goods (Edwards and Lawrence, 2006 and 2008).

Important differences between these two explanations are due to the grouping of industries. Edwards and Lawrence (2006 and 2008) classify industries into commodity and non-commodity manufacturing, finding that non-commodity manufactured exports showed strong growth in the 1990–2000 period, which they attribute to a positive response to trade liberalization. However, this export growth is largely due to the auto industry (both motor vehicle and components exports) and the target of extensive industrial policy as well as ongoing tariff protection. The components include catalytic converters, an auto component categorized under machinery and equipment, as well as seat leather (classified under leather products) (Roberts, 2008; Black and Roberts, 2009; and Chapter 5).

There are at least three other classifications which have been commonly used in industrial competitiveness and diversification studies. These are: Pavitt's classification (Pavitt, 1984); the OECD classification based on R&D intensity introduced in 1994 (for a review see Galindo-Rueda and Verger, 2016); and, the widely

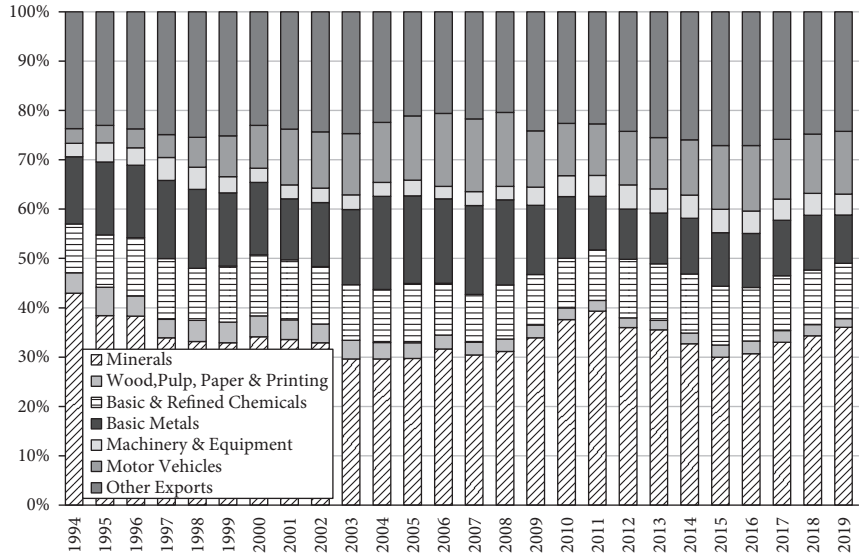

Figure 1.2 Merchandise export shares

Note: Minerals and resource-based exports include minerals; wood, pulp, and paper; basic and refined chemicals; and basic metals (in order from the bottom to the black in the middle of figure).

Source: Quantec, authors' calculations.

used Lall classification (Lall, 2000; see also UNIDO, 2010 for a discussion of the ways in which this classification evolved). As Sanjaya Lall notes (2000: 341) '[j]udgment is inevitably involved in assigning products to categories'. For example, Lall's classification excludes basic chemicals and basic metals (including steel) from resource-based manufactures and rather includes them in medium-technology exports. In South Africa, these industries are closely linked to mineral and resources inputs and, as such, it is clearly more appropriate to group them with resource-based industry. Furthermore, over long periods of time the nature of activities in categories changes and with that their value and technology content (Andreoni, 2020). In this book, the analysis involves in-depth industry studies which take into account the evolving value chain and structure of the sectors.

The South African experience illustrates that diversification, in terms of altering patterns of comparative advantage, is not a simple outcome of trade liberalization. Rather, there is an important role for industrial policy to play in countering path dependency (Amsden 1989 and 2001; Chang and Andreoni, 2020). Instead of growing diversified industries, as many of its middle-income peers have done, South Africa has in fact prematurely deindustrialized (Tregenna, 2016a and 2016b; and Chapter 11). The reasons for this are a core consideration of this book.

The poor overall investment rates (evident from the international comparisons above) are an important factor, even while the commodities boom, infrastructure spending, and credit-driven local demand stimulated higher investment rates in

the 2000s, which peaked in 2008 at 30 per cent of value added. These rates of investment have not been sustained and, within manufacturing, have remained heavily skewed towards the capital-intensive industries of coke and refineries, and basic chemicals. The investments in the basic chemicals and refined petroleum products sectors have been essentially driven by Sasol, whose capital expenditure has generally constituted the majority of investments (Chapter 4). High rates of investment were recorded by the basic metals sectors in the 1990s, which underpinned their growth in output at the time. There has not been any significant sustained growth in investment in downstream and diversified manufacturing.

1.3.3 Lack of Diversification in South African Exports

South Africa's failure to diversify is evident in both the fact that traditional resource-based sectors are mainly responsible for industry output growth in the economy, and that higher levels of investment in the manufacturing sector have continued in these sectors rather than shifting to diversified manufacturing activities. Diversification—or the lack of it—can be illustrated in greater detail in the so-called 'product-space' analysis. South Africa was among the first countries to use an early version of this product-space analysis to show its structural transformation challenges (Hausmann and Rodrik, 2006).

South Africa's product space did not change substantially between the mid-1990s and 2018 (Bell et al., 2018). It has continued to be dominated by low-complexity products, and there has been a failure to form clusters around more advanced manufactured products. As Figure 1.3 shows, exports of minerals, stone and glass, vegetable and foodstuffs, metal products, and chemical products made up most of the export basket (relatively larger dots). Many of the linkages between various products have not been exploited. Instead, the more important export products appear as isolated points. For example, cars are evident, but not auto components (apart from catalytic converters which are classified under centrifuges) and there are mining equipment exports, but not a broader clustering of machinery and equipment, which has characterized countries such as Malaysia and Thailand.

It is important to note that a country's export basket (represented in the product space above) attempts to capture the degree of diversification (or spread) of products as well as the clustering in certain types of products (which reflect characteristics including the degree of technology complexity). These can be understood as an outcome of its unique historical processes of accumulation of productive capabilities, the extent of structural change, and production transformation.

In the South African case, openness to global trade has amplified major differences and contrasts within the economy and society more than it has driven diversification. Firms in advanced niches have been operating side by side with

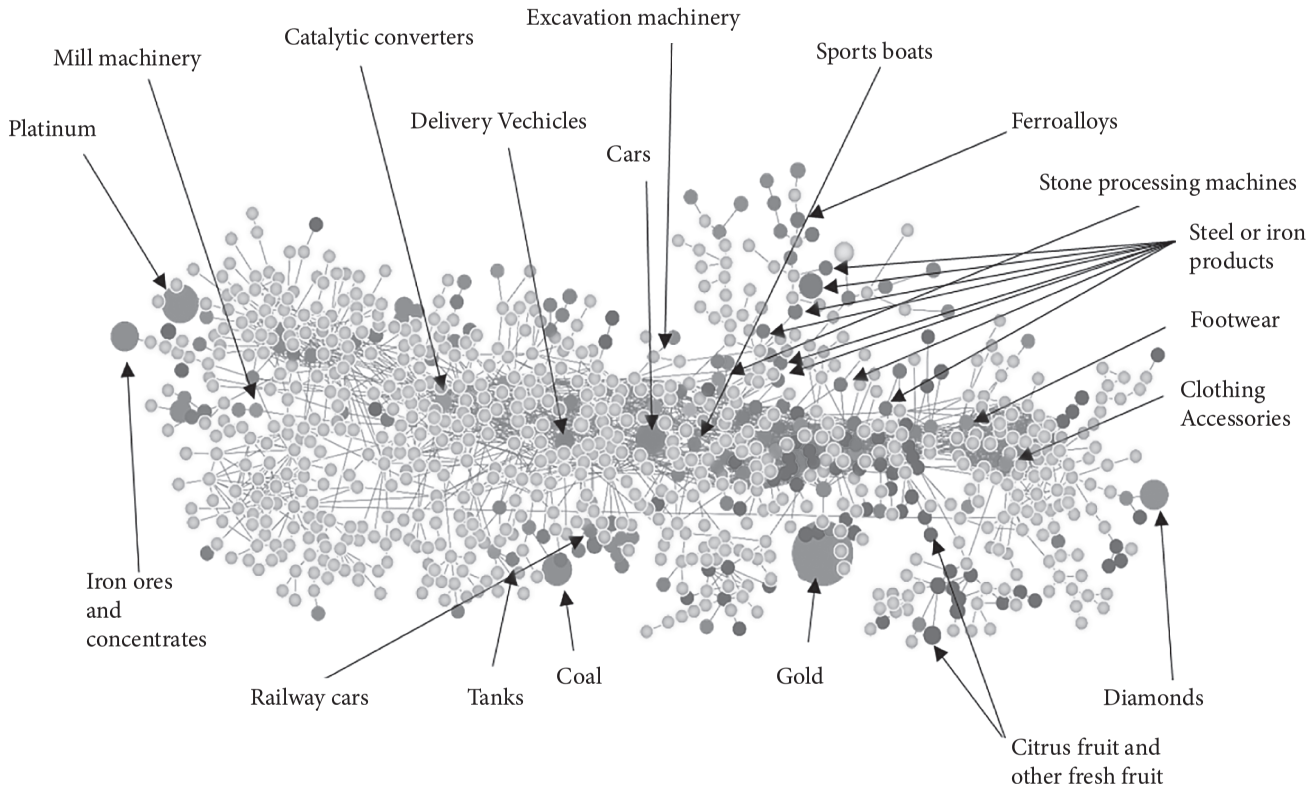

Figure 1.3 South Africa's export basket, 2018

Note: The light grey circles are effectively empty for South Africa, representing product categories in relation to each other based on what countries around the world tend to export, but in which South Africa does not have significant exports.

Source: Atlas of Economic Complexity.

firms with export competitiveness based on historical state support and favourable access to resources, while improvements in living standards for some have coexisted with persistently high levels of unemployment and inequality. Similarly, the expansion of the financial sector has not gone hand in hand with an expansion of productive investments; on the contrary, profitability has been associated with rents capture and weak fixed capital formation (see Chapters 2 and 10). The unfolding of these contradictions and structural tensions has led to political fragmentation and the recent destabilization of the post-apartheid political settlement (Chapter 2).

1.4 Towards a Holistic Framework for Structural Transformation

A number of path-dependent processes, structural interdependencies, and tensions form part of the mix of complex and intertwined factors that have acted as constraints to structural transformation in South Africa. Responding to the need for a more holistic approach to both understanding and advancing structural transformation, this section presents a framework that can be applied in the analysis of the nature and dynamics of structural transformation in middle-income countries more generally. The chapters in the book explore these issues in different ways. The concluding chapter then draws together insights from the comprehensive case study of South Africa, which could help to inform priorities for industrial policy in other middle-income countries.

A holistic framework for structural transformation needs to engage with key micro-structural dimensions and meet several related challenges. The four dimensions embodied in this framework are: learning processes and capabilities development; technological change, and digitalization in particular; economic linkages and power relationships along GVCs; and, broader political economy dynamics. Each is discussed in more detail below. While the dimensions of the framework may be addressed in the chapters at a more implicit level, the chapters that focus explicitly on a particular dimension are mentioned at the end of each section.

1.4.1 Learning, Productive Capabilities Development, and Accumulation

From a micro-structural perspective, production transformation is about learning and selective attempts to develop different types of productive, technological, organizational, and innovative capabilities (Penrose, 1959; Lall, 2001; Teece, 2006; Andreoni, 2014; Chang and Andreoni, 2020; Roberts, 2020a). Firms' capabilities are a combination of the individual and collective competencies that are needed

to perform and organize interdependent productive tasks as well as to adapt and undertake improvements across different technological and organizational functions. Capable agents and functioning organizations can only operate if they are matched by investments in production capacity to attain appropriate scale and scope. The capabilities needed to generate, absorb, and manage technological and organizational change and those needed to seize new opportunities—i.e. dynamic capabilities—differ substantially from those needed to operate existing production systems.

Developing and accumulating capabilities in activities in which firms are not yet competitive requires effort to learn to use new technologies and acquire new tacit knowledge. This can be expensive and time-consuming; the returns from these investments are not guaranteed, and they also depend on spillovers and linkages from other firms (Lall and Teubal, 1998; Lall, 1992; Khan, 2009; Andreoni, 2019; Whitfield et al., 2020). There is not comprehensive knowledge of alternative production techniques, and thus finding suitable technology at the right price involves cost and risk (Nelson and Winter, 1982; Lall and Pietrobelli, 2005). As a result, private firms tend to underinvest in the related activities required to accumulate capabilities. The learning element of technologies is important for adapting the technology to different scales, new input and skill conditions, and different product demands. The challenge of ensuring high levels of effort by the firm in the process of learning-by-doing is the biggest constraint to absorbing new technologies. This is where the important role of the state comes into play (Khan, 2009).

These considerations indicate that sub-sectors are internally highly heterogenous as the factors operate and differ at the level of individual firms and clusters within sub-sectors. This is borne out in the micro-industrial development, firm-focused, evolutionary, and related bodies of literature (Penrose, 1959; Andreoni, 2014; Rosenberg, 1982; Amsden, 1989 and 2001; Dosi et al., 2000; Lall, 2001; Teece, 2006; Andreoni and Chang, 2017; Avenyo et al., 2021). Owing in part to data limitations, aggregated quantitative analyses do not account for important differences, and in some cases provide misleading insights about the process of structural transformation. For example, as shown by recent contributions (Dosi et al., 2020; Tregenna and Andreoni, 2020), the traditional patterns of deindustrialization are highly heterogenous across manufacturing sub-sectors, or different sectoral groupings defined by technological or other organizational features (Pavitt, 1984's and Lall, 2000's taxonomies). Thus, it is important to go beyond both the broad sub-sectoral analysis and the recognition of the continuing importance of manufacturing, and to start taking account of the more complex dynamics within and between firms.

This makes the case for in-depth industry study, as reflected in Chapters 3 to 7. Together, these chapters cover developments in metals and mining machinery, manufacture of plastic products, the auto industry, evolving competitiveness in fresh fruit production, and the wine industry. The role of the financial sector in

South Africa in the context of weak investment in more sophisticated and diversified economic activities is considered in Chapter 10.

1.4.2 Technological Change and Digitalization in Light of Sustainability Challenges

Structural transformation perspectives need to take account of the rapid pace of technological change within and beyond the manufacturing sector, and more broadly the rise of cross-sectoral challenges and the need for cross-sectoral solutions. Sectoral boundaries are also increasingly redefined by new technologies. The terrain of the industrial has been shifting—contracting and expanding—to give space to both servicification and agricultural industrialization (Andreoni, 2020; Cramer and Tregenna, 2020).

Technological change is of course not new. But the development of wide-scale digital applications is accelerating the pace of technological change exponentially. Further, this change is systemic, pervasive, and includes an integration between the digital, physical, and biological domains in ways thus far not seen. These developments have been characterized under the broad rubric of the 'fourth industrial revolution'. Clearly, the accelerating pace and impact of technological change need to be factored into current thinking and policy prescriptions around structural transformation. They also call for more 'ecosystem'-oriented frameworks (Andreoni, 2018) that are capable of taking into account both sector value-chain specific dynamics and cross-sectoral technological dynamics.

Structural transformation perspectives often have not engaged sufficiently with the relationship between industrialization and climate change, and the need to reduce carbon dioxide (CO_2) emissions in particular. Climate change impacts different groups and sectors differently, but it is one of the most striking cross-sectoral challenges of the time. Industrial production has been identified as a key source of emissions, with evidence of an inverted-U relationship between industrialization and emissions (see, for example, Barca and Bridge (2015); Avenyo and Tregenna (2021)). This suggests a possible tension between the dual imperatives of industrializing and mitigating climate change. This tension is particularly stark for late industrializers, since early industrializers were not constrained by the need to simultaneously reduce emissions. In recent years, there has been a growing body of literature and policy discourse exploring a green industrialization path that is compatible with mitigating climate change, and green industrial policy (see, for instance, Rodrik (2014); Fischer (2016); Altenburg and Rodrik (2017); Andreoni and Chang, (2017); Pollin (2020)).[10]

[10] See also Chapter 7 in this volume, which explores issues of sustainability and inequality in the context of the South African wine value chain.

In addition to the industry-focused chapters which consider both the legacy impacts of resource-based industrialization as well as the impact of sustainability standards (such as in wine), the challenges of the middle-income technology trap are considered in detail in Chapter 11, and digitalization is addressed in Chapter 12.

1.4.3 Global Value Chains and Power Dynamics

The structural transformation of developing economies is taking place in the context of the globalization of production, where decisions on the geographical location of production are largely determined by lead firms in GVCs. Understanding upgrading opportunities from participating in GVCs requires engagement with strategies of multinational corporations (MNCs) including those related to outsourcing, offshoring, and reshoring. Though participation in GVCs presents opportunities for upgrading through international linkages, learning by exporting and FDI spillovers such as access to technological knowledge and generating learning and innovation activities, this process is not automatic (Gereffi et al., 2005). The gains from participating in a GVC are dependent on power asymmetries or the governance structures which determine where and by whom value is created and captured (Gereffi and Lee, 2012) and how this enhances or hinders capability upgrading.

The skewed power relations within GVCs often imply that the bulk of the value is captured by lead firms that can leverage a combination of direct and diffuse forms of power transmissions (Dallas et al., 2019). The distribution of value added in GVCs is often illustrated by means of the 'smile' curve (Durand and Milberg, 2020). In this curve, developing economies tend to participate in the fabrication levels that are subject to intense international competition, and thus have limited possibilities to capture value. This has been further heightened by the disproportionate distribution of value capture to intangible assets (held by lead firms) rather than physical assets (held by suppliers). With increasing levels of competition in the supply levels, lead firms also have reduced incentives to support upgrading of local firms. The state has an important role to play in tipping the calculus of the lead firms in one direction instead of the other. Norms of fair and reasonable market relationships need to incorporate the balance through regulation and building multi-stakeholder consensus on the importance of shared longer-term investments (Goga et al., 2020; Mondliwa et al., 2021). This involves collective and institutional power relations (Dallas et al., 2019).

Though governance and power in value chains has primarily been studied in relation to GVCs, it is important to note that some of the observed dynamics particularly relating to value distribution and capture are also present in domestic value chains (Mondliwa et al., 2020). For example, the competitive dynamics and outcomes in one level of the value chain can impact the development of whole

sectors through vertical linkages, which can promote or undermine structural transformation (Lee et al., 2018; Goga et al., 2020).

The influence of power dynamics in industries and the implications for inequality is assessed in the South African case in Chapter 8, and the record on BEE initiatives is analysed in Chapter 9. Chapter 13 looks specifically at industry challenges in linking into GVCs while linking back to develop stronger local production capabilities.

1.4.4 Political Economy and the Role of the State

The micro-structuralist approach advanced here places emphasis on the role of the state in supporting processes of structural transformation. This is because successful structural transformation requires a proactive industrial policy that steers and supports learning, productive capabilities, and technological change; regulates power dynamics and rewards value creation and innovation; and manages conflicting claims, while disciplining unproductive rent-seeking (Andreoni and Chang, 2019; Chang and Andreoni, 2020; Roberts, 2020b). Contributions on the political economy of structural transformation have also emphasized how states' capabilities to manage rents, including monitoring and disciplining rent recipients to ensure productive investment for growth, are in turn influenced by the distribution of power within a society—its broader political settlement (Gray, 2018; Khan, 2018).

The political economy of structural transformation is therefore about not only understanding how the state can drive and give directionality to the process of structural transformation, but also how the state is formed and shaped by emerging interests, conflicting claims, and changes in the distribution of organized power. The analysis of this dialectic process linking structural transformation to state formation is critical in assessing the effectiveness of industrial policy. Research on successful catching-up experiences has shown how state embeddedness is critical in designing effective industrial policy and organizing coalitions of interests around specific structural transformation targets (Chang and Rowthorn, 1995; Evans, 1995; Weiss and Hobson, 1995). However, it has also noted cases in which unproductive interests have captured the state and limited its capacity to drive change through industrial policies (Khan and Jomo, 2000).

Within this perspective, industrial policy is not simply an exercise in addressing market failures, or other types of systemic failures. Instead, industrial policy is the main policy process through which the state sets the terms of the social contract underpinning structural transformation (Andreoni and Chang, 2019). Seen through these lenses, industrial policy and all the related policies shaping capabilities development, technological change, and value distribution within and across productive organizations are central to the study of structural transformation.

The way in which the state uses industrial policy in combination or in contraposition to other policies, such as competition policy, is also central. In fact, from this political economy perspective, the lack of policy coordination is both the result of limited government capabilities, and the fragmentation of interests and power distribution across the economy. The study of the state—its internal configuration and capabilities, as well as its underpinning political settlement—is therefore a key dimension in understanding and driving structural transformation.

The political economy of industrial development cuts across all the chapters and these issues are specifically drawn together in Chapter 14.

1.5 Concluding Remarks

This chapter, and this volume as a whole, draws on the longstanding literature from a broad structuralist perspective on the importance of structural transformation for economic development and catch-up (Blankenburg et al., 2008). For middle-income countries, this is particularly important for avoiding or escaping a middle-income trap, and is a key precondition to sustaining broader structural transformation. This points to the ongoing importance of industrialization, and indeed of reindustrialization where premature deindustrialization has already taken place.

With a focus on the South African economy, the ideas put forward in this chapter advocate for the development of a more holistic approach to structural transformation that is focused on key micro-structural dynamics of change, four of which are highlighted in the chapter: (1) learning, productive capabilities development and accumulation; (2) technical change, digitalization, and sustainability; (3) GVCs and power dynamics; and (4) political economy and the role of the state. These are addressed in the chapters that follow through in-depth studies of key industries in South Africa, which may also make reference to the international context. Other studies address cross-cutting issues, such as BEE, inequality, financialization, and sustainability, and how they pertain to industrial development.

Recognizing the importance of structural transformation underscores the key role of industrial policy, since structural transformation is not something that unfolds automatically (see also Chapter 15). Appropriate state-led interventions are needed to unlock and shape a viable industrialization path that countries can pursue. For industrial policy to successfully advance structural transformation, it needs to be well coordinated with other relevant policy domains. For instance, supportive macroeconomic policy is required to ensure adequate domestic demand, access to finance, and a competitive exchange rate for manufacturing exports. Similarly, there is a need for coordination with competition policy, trade policy, innovation and technology policy, and so on. In these regards, the case of South Africa provides salient lessons, as are drawn out in subsequent chapters.

Industrial policy is critical in enhancing countries' collective capabilities, through transforming sectoral silos into ecosystems of productive organizations and effective institutions. This will enable the digitalization dividend to be harnessed and the sustainability challenge turned into an opportunity for development. The management of rents within markets and along value chains, as well as new forms of rents arising from new digital platforms, is critical, including in opening up economies and unlocking opportunities for more distributed organizational power, beyond conservative and rentieristic positions.

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