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Leveraging Plastics Linkages for Diversification

An Assessment of Backward Linkages from Polymers and Forward Linkages to the Automotive Industry

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4.1 Introduction

At the core of structural transformation is the diversification of an economy, generally based on linkages to support cumulative productivity increases. In the early 1990s, South Africa's industrial core was made up of a set of sectors spanning mining, energy, and various heavy industries. The strong input-output linkages between them, but weaker linkages with other manufacturing sectors, resulted in an economic structure that has been identified as the minerals and energy complex (MEC) (Fine and Rustomjee, 1996). An assessment of South Africa's structural transformation over the post-apartheid period from 1994 to 2019 necessarily entails an evaluation of the extent to which the economy has diversified away from the MEC core and towards more diversified downstream industries within the MEC.

This chapter analyses the development of the downstream plastic products industry, which has strong backward linkages to the upstream, petroleum industry for its main material inputs. At the same time, plastic products are a diverse set of manufactured goods for final and intermediate use and, as such, the sub-sector has strong forward linkages to the rest of manufacturing, with 54 per cent of output consumed by the range of manufacturing sub-sectors in 2019. While the upstream petrochemicals activities and some downstream manufacturing activities that consume plastic products, such as the automotive industry, have grown throughout the 1994–2019 period, plastic products have recorded poorer performance (Chapter 1). The plastic products sub-sector grew between 1994 and 2002, but declined thereafter, with weak performance in terms of output, value added, and investment, as with other diversified manufacturing activities (Mondliwa and Roberts, 2019).

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This raises two important questions. The first is why the growth of those industries requiring plastic components, such as automotive, has not acted as a demand pull. This question is analysed through a comparative assessment of the South African and Thai plastic automotive component industries. The focus is on how the two countries have attempted to foster technological upgrading and production capability accumulation by leveraging linkages to the automotive industry. While both South Africa and Thailand have embarked on targeted industrial policy to grow their automotive industries, very different results in terms of upgrading in the linked components industries have been observed, and Thailand is currently significantly more competitive (on South Africa, see Chapter 5).

The second is why the growth of the upstream polymer industry—in part due to South Africa's cost advantages in the production of basic petrochemical inputs—has not supported growth of plastic products. This is assessed through an analysis of the vertical relationships between the upstream polymer industry dominated by Sasol, and downstream plastic producers. The analysis focuses on the extent to which pricing decisions by the lead firm and policy (including regulatory decisions) in the upstream polymer industry have had an impact on the growth path of the downstream industry.

Overall, the chapter considers the role of policies, lead firm strategies, and governance in facilitating technological upgrading and the accumulation of productive capabilities necessary for the formation of linkages.

The rest of the chapter is organized as follows. Section 4.2 discusses the dynamics of structural transformation through linkages by reflecting on existing literature. Section 4.3 provides an overview of the structural change patterns in the linked petroleum, basic chemicals, and plastic industries. Through a comparison of South Africa and Thailand, section 4.4 assesses technological and production capability accumulation in plastic automotive components with a focus on the importance of the linkage to the automotive industry. Section 4.5 presents an analysis of the backward input linkages to the polymer industry with a focus on the lead firm, Sasol. Concluding remarks are made in section 4.6.

4.2 Structural Transformation through Exploiting Forward and Backward Linkages

The premise of growth through linkages stems from the early contributions by Hirschman (1958), which demonstrated the significance of backward linkages to input producers and forward linkages to markets for intermediate products in supporting structural change and productivity growth necessary for economic development. Linkages create multiplier effects, such that support for final goods producers can increase the range of components or inputs produced, broadening the industrial base and attracting the entry of further final goods producers in an

economy (Baldwin and Venables, 2015). Country comparisons have shown that those countries that have strong production linkages with both domestic and foreign suppliers have been more successful in changing the structure of their economies and achieving economic development (Haraguchi and Rezonja, 2015).

In resource-rich countries like South Africa, backward and forward production linkages from the resource industries provide an important and often unrealized potential for industrial development (Morris et al., 2012) and thus for structural change. This is because successful economic development is essentially an incremental unfolding of linkages between related economic activities. This process is supported by an accumulation of capabilities including technological upgrading (Tregenna, 2012).

Many plastic products are intermediate components, which rely on linkages with input suppliers and with downstream industries. Literature on value chain governance shows how corporate power exercised by large and lead firms shapes the distribution of profits and risks in an industry, and how this alters the upgrading prospects of firms in developed and developing economies that are included in (or excluded from) the supply chain (Gereffi and Lee, 2016). Lead firms play a crucial role by defining the terms of participation in value chains, by incorporating or excluding actors, and by determining how, when, where, and by whom value is added (Gereffi and Lee, 2016).

While much attention has been paid to governance within global value chains (GVCs), a number of similar dynamics are also present in domestic value chains. First, firms with market power can exploit the downstream businesses reliant on the products as inputs through charging high prices, and can also leverage this power to undermine downstream rivals (Goga et al., 2020; Mondliwa et al., 2021). Distortions in input markets have been found to explain productivity differences within value chains and in the competitiveness of sectors (Acemoglu et al., 2007; Jones, 2013). Second, market power often translates into political power, whereby dominant firms can influence policy and regulation in their favour (Zingales, 2017; Goga et al., 2020). Third, firms also share knowledge and practices vertically through the supply chain, and large and lead firms often drive this process (as discussed in the Thai case in section 4.4). In this regard, the strategies of large and lead firms, as well as their capabilities, can have an impact on the propensity for positive linkage development along value chains.

While the GVC approach brings out elements of learning from geographically dispersed and vertically fragmented production networks (Gereffi et al., 2005), clustering analytical frameworks emphasize the importance of co-location and the creation of dynamic linkages for achieving increased competitiveness, as well as the upgrading of firms (Porter, 2000). These clusters can include firms in vertical or horizontal relationships. The emphasis is on collaboration among different stakeholders to take advantage of interdependencies in the production

process (Götz and Jankowska, 2017). In particular, small firms in horizontal clusters are supposedly able to overcome some of the major constraints they usually face: lack of specialized skills, difficult access to technology, inputs, markets, telecommunication, credit, and external services (Giuliani et al., 2005). Participation in a cluster allows for collective benefits (positive externalities) for firms engaging in similar activities. These include, for example, the pooling of skilled labour and facilities, including testing and research facilities for design and product development. In the analysis here, value chains are used to capture the vertical relationships, and clusters are used to capture the horizontal relationships between firms.

Technological 'learning' and developing production capabilities are areas in which collective action by government and firms play an important role. International experience in the development of local industrial clusters or upgrading within value chains demonstrates the importance of the public sector in creating appropriate institutions and an enabling policy environment (see, for example, Best, 2001; Lema et al., 2018). In this regard, industrial policy is critical. Industrial policies can play an important role in developing linkages either through solving market failures, developing supportive institutions, or engaging in the process of discovery. When effectively coordinated, industrial policy incentives can promote both the breadth of linkages (the proportion of inputs sourced locally or outputs processed locally) and the depth of linkages (the extent of their domestic value added) (Morris et al., 2012).

4.3 Structural Change Dynamics within the Chemicals and Plastic Products Industry Grouping

The chemicals and plastic products industry grouping has been an important part of South Africa's industrial core throughout the twenty-five-year period under review (1994–2019). In 2019, the industry grouping accounted for 24 per cent of manufacturing value added (up from 16 per cent in 1994), 18 per cent of manufacturing exports (up from 16 per cent in 1994), and 13 per cent of manufacturing employment (up from 7 per cent in 1994). The broader chemicals and plastic products grouping is made up of a range of value chains. These include a wide range of activities, from resource extraction (crude oil, coal, and natural gas) and refining, to various levels of basic chemicals processing to produce industrial and consumer products, including plastic products. This chapter focuses on only one of these value chains—the petrochemical co-products to polymers (one of the many basic chemicals), to plastic products and the linked automotive assembly industry.

Plastic products are an important area of focus: they have been identified as having high potential for pulling along growth and are thus important for

cumulative productivity increases (Tregenna, 2012); they are relatively more labour-absorbing (Table 4.1), which is a priority for South Africa's industrial policy; and, constituting mostly intermediate products, they are central in diversified manufacturing through their extensive forward linkages (Figure 4.1).

The petrochemical value chain in South Africa is characterized by highly concentrated upstream manufacture of polymer chemicals, closely linked with the processing of petroleum products, and lower levels of concentration in the downstream manufacture of plastic products. There are only two polymer producers in

Table 4.1 Performance of the chemicals and plastic products sub-sectors

		Coke and refined petroleum	Basic chemicals	Other chemicals	Plastic products
Value added R'bn)	1994	10	8	12	8
(% share of total		(4.4%)	(3.5%)	(4.9%)	(3.2%)
manufacture)	2019	35	17	26	11
		(9.3%)	(4.6%)	(7.0%)	(3.0%)
Employment	1994	18	26	37	44
(in thousands)		(1.1%)	(1.5%)	(2.1%)	(2.6%)
(% share of total	2019	27	28	83	59
manufacture)		(1.8%)	(1.8%)	(5.5%)	(3.9%)
Avg. valued-added	1994–2002	6.9%	6.5%	6.5%	5.6%
growth	2002–8	4.6%	2.6%	6.3%	−1.1%
	2008–19	3.8%	0.8%	−0.6%	0.1%
Avg. employment	1994–2002	−4.4%	−1.1%	0.7%	3.4%
growth	2002–8	17.4%	2.1%	8.8%	0.0%
	2008–19	−1.9%	0.5%	2.3%	0.5%
Avg. investment	1994–2002	35.5%	57.3%	15.9%	17.3%
(gross fixed capital	2002–8	36.5%	64.7%	15.0%	20.4%
formation, % of	2008–19	30.0%	52.7%	13.1%	17.9%
gross value added)					
Imports as % of	1994	5.6%	57.6%	32.5%	11.4%
domestic demand	2002	7.1%	24.3%	21.3%	11.2%
	2008	20.4%	36.2%	27.1%	19.8%
	2019	29.4%	37.4%	25.2%	33.7%
Exports as % of	1994	33.4%	20.5%	5.8%	2.6%
domestic output	2002	21.5%	17.8%	8.1%	4.4%
	2008	13.6%	36.0%	11.7%	9.4%
	2019	27.1%	46.1%	20.5%	16.6%

Notes:

1. 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, and this should be borne in mind.
2. Value figures are in ZAR millions (constant 2010 prices).
3. Growth is calculated as compound average growth rates.
4. Employment numbers include informal jobs.

Source: Quantec, authors' calculations.

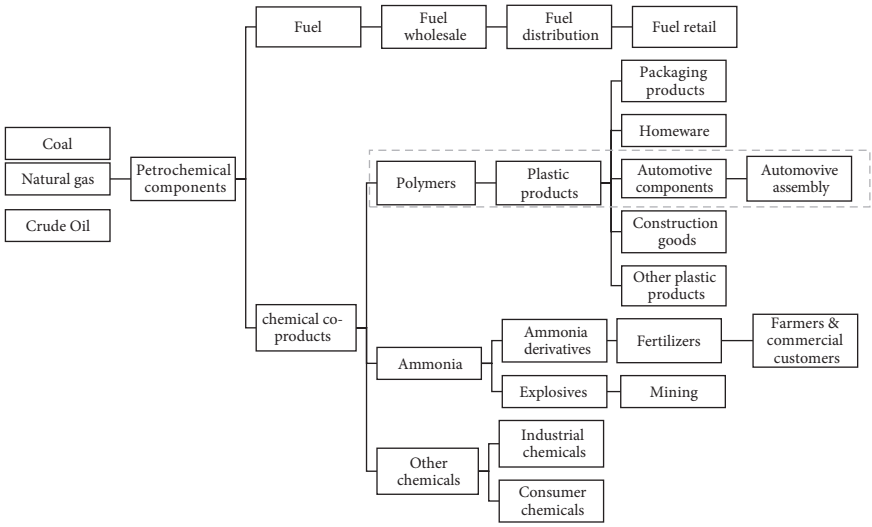

Figure 4.1 The petrochemical value chain
Source: Adapted from Mondliwa et al. (2020).

South Africa—the formerly state-owned Sasol, with a 60 per cent share of the commonly used polypropylene input, and Safripol, with the remaining 40 per cent. Sasol's power comes from it holding a monopoly position in important monomers such as propylene which are chemical co-products from refining and are used in the production of polymers.

In contrast, the manufacture of plastic products is characterized by relatively low-scale economies with many of the producers being small and medium-sized firms. Plastic production itself is diversified, with products differentiated by the sectors into which they form inputs, such as motor vehicles, building materials, electrical products, and packaging (Figure 4.1).

Over the twenty-five-year period under review (1994 to 2019), the upstream coke and refined petroleum products and basic chemicals sub-sectors recorded strong overall performance in terms of value-added growth, supported by relatively high levels of investment (Table 4.1). By comparison, the plastic products sub-sector performed well in the earlier part of this period with average annual growth in value-added of 5.6 per cent between 1994 and 2002, and employment growth of 3.4 per cent. However, the plastic products sub-sector lagged other industries in the value chain thereafter. There have been relatively low levels of investment in plastic production, as gross fixed capital formation averaged around 17 per cent to 20 per cent of value added.

South Africa's trade liberalization appears to have benefited the upstream basic chemicals sub-sector, with improved competitiveness in both domestic and

export markets.[1] However, after the period from 1994 to 2002, import penetration in the plastics sub-sector increased substantially, from 11.2 per cent in 2002 to 33.4 per cent in 2019, reflecting a loss in competitiveness in the domestic market, although exports also increased somewhat to 16.6 per cent of domestic output over the same period (Table 4.1).

Why then, despite South Africa's initial success in plastic production in 1994–2002 and cost competitiveness in the upstream polymer inputs, has the industry performed so poorly over time? The liberalization of protection had been assumed to improve the capabilities of the downstream industries, through international integration and the industry support measures provided. However, as analysed below, the linkage development has been weak and industrial policy interventions not been well coordinated.

Within the plastic products industry, there has also been a failure to move towards the more complex product segments such as components for automotive, electronics, and medical products. The industry has continued to be dominated by the less tradable packaging segment, which continued to account for more than half of the sub-sector's output, signifying poor diversification (Beare et al., 2014; Bell et al., 2018). Though packaging is the largest segment in most countries (for example, around 40 per cent in the EU), the share in South Africa is particularly high. This matters for understanding capabilities and competitiveness of plastic production as packaging is relatively less traded and, as such, benefits from some protection from import competition.

While the industry's import penetration increased over the period, the overall picture masks important trends within the sub-sector. Import penetration appears to have increased most in the more sophisticated automotive components, medical, and sports and leisure segments, at over 70 per cent in 2013 (Mondliwa, 2018). And, instead of plastic product exports becoming more diverse over time, they have become more concentrated in lower-value segments (Beare et al., 2014).

The rest of the chapter assesses the developments in more detail: first, by conducting a comparative analysis of technological upgrading in the plastic automotive components segment in Thailand and South Africa in section 4.4; and, second, by assessing how market power, governance dynamics along the value chain, and industrial policy have supported or undermined development along linkages between upstream polymers and downstream plastic products, in section 4.5.

Plastic automotive components represent an important segment due to their relative complexity and potential for upgrading through forward linkages. In addition, the policy framework that supports the automotive sector was meant to

[1] The increased import penetration in coke and refined petroleum is a result higher imports of fuel blending components to meet clean fuels specifications.

support upgrading in linked industries and the framework did support increased output and South African exports of assembled vehicles implying growing demand for components.

4.4 Leveraging Forward Linkages to the Automotive Sector: A Comparative Analysis of Plastic Automotive Components in South Africa and Thailand

Thailand presents a successful case study of fostering linkages between the automotive industry and the development of plastic and other automotive components (Black et al., 2018; Monaco et al., 2019). Leveraging this linkage, the Thai plastic automotive components segment has experienced high growth rates relative to South Africa. For example, between 2001 and 2018, Thailand grew exports of motor vehicle bumpers and their parts, such as fittings, at a compound average growth rate of 16 per cent, while South Africa's exports grew by a more modest 2 per cent.[2]

This linkage has supported the diversification of plastic production in Thailand with the plastic automotive component segment increasing its contribution to total plastic production volumes to 8 per cent in 2018. South Africa compares poorly in this area, with the plastic automotive component segment accounting for only 4 per cent of total production, with the majority of production focused on packaging and less sophisticated plastic product segments. In terms of the number of firms, 16 per cent of the 5,000 Thai plastic products firms manufacture automotive components (Monaco et al., 2019), compared to a much smaller share of the 1,800 South African firms.

While Thailand's proximity to the developed ASEAN regional market demand has allowed it to achieve scale economies and is an important contributor to its success (Monaco et al., 2019), this has not been the only success factor. The automotive component industry has built robust technological capabilities through strong collaborations—both vertically through the value chain and horizontally through clusters (Monaco et al., 2019). In addition, the state and industry associations have played an important role in both facilitating inter-firm collaborations and coordinating policy incentives for development of the component industry (Monaco et al., 2019). These factors have allowed Thailand to leverage participation in the automotive GVC to grow plastic and other automotive component production. The focus is on understanding the drivers of success and failure in leveraging these linkages.

[2] South Africa also focuses more on the actual bumpers rather than the more sophisticated fittings, suggesting relatively weaker capabilities.

The comparison comprises two main parts. First, the accumulation of technological capabilities in both Thailand and South Africa's plastic automotive component manufacturers are compared. This includes a discussion of the role played by firm collaborations in horizontal clusters, and the role played by vertical integration through the value chain in supporting capability upgrading.

Second, the factors that have supported the formation of the horizontal and vertical collaborations and technological upgrading more generally are discussed. This includes a discussion of how targeted automotive industrial policies have been leveraged to develop automotive components, the role of the state in the coordination of policies for capability upgrading, and the interactions between the state and the multinational original equipment manufacturers (OEMs) that govern automotive value chains.

4.4.1 Technological Capabilities and Competitiveness

As many plastic products are of intermediate goods, demand linkages to industries that require these as inputs are important.[3] Among the potential benefits of participation in the automotive GVC are the opportunities to meet increased domestic demand and the upgrading of technological and other capabilities of the supply chain (Gereffi, 2019). Technological capabilities are also important factors for countries to upgrade within GVCs and for linking back into the domestic economy.

4.4.1.1 The State of Technology Infrastructure

The technology divide is the overwhelming difference in competitiveness between South African and Thai firms. Since the 1980s, Thai firms have made significant improvements in both production and operational management techniques (Monaco et al., 2019). Overall, the Thai firms were operating with up-to-date technology infrastructure (e.g. machines, moulds). Thai plastic auto component suppliers have gradually introduced robotics and other technologies linked to the fourth industrial revolution, such as the internet of things (Monaco et al., 2019). The Thai firms also demonstrated the capacity to innovate, due in part to investment in research and development, and testing and prototyping facilities, all supported by synergies between the plastic industry and government centres such as the Plastics Institute of Thailand (PITH).

Evidence from the South African plastic automotive component suppliers tells a starkly different story. In terms of technology infrastructure, there are differences among the local subsidiaries of multinational corporations (MNCs),

[3] This section builds on fieldwork conducted in Thailand for the IDTT during October 2018 (see Monaco et al., 2019).

local small and medium-sized firms, and large domestic firms. Local subsidiaries of MNCs tended to have newer machines, their own tool rooms, and were already using technologies linked to the fourth industrial revolution, with some degree of technology adaptation taking place in the domestic production facilities (Bell et al., 2019). However, strategies for technological upgrading are developed in the home countries and most research and development occurs in the MNCs' headquarters abroad. The large domestic firms were also relatively up to date in terms of technology used, had their own tool rooms, and some degree of R&D that was mainly focused on adaptation. In contrast, the small and medium-sized firms (SMEs) had little engagement with technology changes, the firms tended not to have tool rooms, and had no formal R&D activity (Bell et al., 2019). Regarding age of machinery, South African firms had machines with an average age of around eighteen years which is old compared to the norm of replacing machinery after seven to ten years of use (Bell et al., 2019).

The analysis of technology infrastructure also considered the origins of the machinery used by firms, where European moulding machines are reported to have better precision, an important quality for more complex plastic products. South African firms appear to be shifting towards the use of Chinese machines, as they are relatively cheaper. In 1994, 60 per cent of imports of moulding machinery were from Europe, while in 2018 the bulk of moulding machines (55 per cent) were coming from China (Bell et al., 2019), with the change largely driven by cost differences. South African firms also have a far lower propensity to invest in R&D, opting for short-term solutions to problems rather than investing time and resources into building strong R&D capabilities as the Thai firms do (Garisch, 2016). Financial constraints are cited as the main reason for the reluctance to upgrade their technological infrastructure. This is largely because the local South African firms, particularly the SMEs, are trapped in a vicious circle of low margins (partly from the polymer input prices), low levels of investment in up-to-date technology, and poor competitiveness (Mondliwa, 2018).

4.4.1.2 Technological Capabilities Can Be Achieved through Vertical and Horizontal Collaborations

One way in which downstream plastic product manufacturers can realize improvements in technological capabilities and R&D capacity is through an acquisition or joint venture with an innovative firm. In Thailand, the increasing adoption of technology has been facilitated through vertical collaborations between Thai component manufacturers and MNCs, in particular Japanese OEMs (Monaco et al., 2019). Partnerships between the OEMs and local firms have improved management and production techniques through continuous human resource development, employee training and education in new technologies, connection with external markets, and through the attention paid to improving efficiency in the manufacturing process. Similarly, collaboration in

R&D, testing, and prototyping facilities has been crucial for improving and maintaining quality and standards, as well as allowing Thai firms to become leaders in innovation. This means that Thai firms are significantly more competitive in the auto components export market (Monaco et al., 2019).

The successful vertical collaborations between local and foreign-owned firms in Thailand have been complemented by horizontal collaborations in the form of clusters. The potential for a cluster to jointly develop technological capabilities is strongly connected to the quality and strength of linkages developed. As such, the development of industrial clusters has been considered crucial for the development of industries, such as the automotive industry, where the components are heavy and bulky, and just-in-time manufacturing is necessary to improve competitiveness (Kuroiwa et al., 2017). The locating of firms in clusters together with organizations that support innovation can promote the 'interactive learning' process, which in turn provides an opportunity for local firms to upgrade their capabilities (Malmberg and Maskell, 2006). The Thai state's cluster programmes have been designed to attract increasingly larger amounts of FDI and facilitate technological upgrading within the automotive industry by positioning large OEMs within a close geographical proximity to small and medium-sized component manufacturers. Automobile and auto parts producers have been encouraged to locate their operations in Bangkok and the surrounding central area (Techakanont and Charoenporn, 2011). Combined with the involvement of Japanese capital, this has fostered the strong growth in technological capabilities in these sectors.

In contrast, there has been limited collaboration for 'learning' and building capabilities in the plastic products and automotive industries in South Africa. Some success was observed in the Durban Automotive Cluster where there is a vertical cluster championed by Toyota and which includes various players in the value chain (Black et al., 2018). The success is limited, however, as spinoffs in other provinces such as Gauteng and the Eastern Cape have not been as effective.

Linkages between private and public investments in R&D and innovation have also been more successful in Thailand, where they have been coordinated by the PITH. In South Africa, the plastic products sector has a limited number of laboratories conducting R&D and testing of locally produced products for exports (IPAP, 2018). A partnership between Plastics SA and the Council for Scientific and Industrial Research (CSIR) was formed to encourage innovation and the use of new technologies in the plastic industry in 2018. However, the project is focused more on the recycling of polymers and bio plastic inputs.[4] While these are important for sustainability, there is still insufficient focus on innovation related to the final plastic products.

[4] https://www.crown.co.za/environment/7533-plastics-sa-overcoming-challenges-with-collaboration-and-innovation.

4.4.2 The Role of Industrial Policy and Governance by OEMs

The analysis above points to the important role played by vertical and horizontal collaboration in building technological capabilities in Thailand. This section discusses the role of policy interventions in the automotive industry, the importance of policy coordination, and the governance role of multinational OEMs in facilitating these collaborations in Thailand and South Africa.

4.4.2.1 Thailand

In terms of policies, both South Africa and Thailand have been through iterations of industrial policy targeted at developing automotive industries, including the linked automotive components. The Thai Automotive Masterplan has offered several incentives that have facilitated an influx of foreign investment from global multinational assemblers who set up large-scale production facilities in the country. The establishment of a world-class domestic automotive components industry was in part due to the local content policy that was part of the Masterplan. Though the local content policy was initially opposed by the larger Japanese assemblers, negotiations involving the state, the assemblers, and component manufacturers led to its adoption. Lobbying by the industry associations representing domestic automotive components manufacturers played an important role in influencing the policy decisions (Poapongsakorn and Tangkitvanich, 2001).

A number of complementary incentives and policies have aided in the execution of the Thai Masterplan. These include the development of infrastructure in the form of special economic zones and industrial parks, education and training in firms, and the provision of finance for the purchase of up-to-date technologies. The Thai state has coordinated many of these incentives through various cluster initiatives that have linked locally owned Thai auto component manufacturers with large, multinational auto assemblers.

This suggests that the political economy dynamics in the Thai economy have significantly enabled the success of the Thai auto component sector. Specifically, the Thai state and the various associations and institutions in the automotive industry have complemented the presence of a strong regional market to realize the success of the Thai Masterplan (Monaco et al., 2019).

The governance role of MNCs and the ability of the state to shape their orientation have also been critical for developing plastic and other automotive components. At the global level, the significant size and power of large multinational automotive assemblers affects multiple levels within the supply chain and the broader institutional setting in which the industry operates. Owing to their dominant positions, these large multinational assemblers can affect investment (Monaco et al., 2019). This determines both the rate and success of the development of the national supply chain, particularly in the context of technological upgrading.

Similarly, these large and dominant assemblers can influence the policy space in which the state operates. The bargaining dynamics between the state and large multinationals are crucial for understanding supply-chain development (Monaco et al., 2019). Owing to a number of institutional arrangements and the formation of a strong coalition between the state and the multinational companies, Thailand has been able to grow its auto component sector around its automotive sector. The attraction of FDI has therefore been a key part of Thailand's success, acting as a catalyst for knowledge diffusion and the local capability building (Techakanont and Terdudomtham, 2004). Many of Thailand's SMEs that make up the bulk of its component manufactures have been developed as part of joint ventures with Japanese OEMs (Monaco et al., 2019).

4.4.2.2 South Africa

In South Africa, the political economy dynamics and their effect on the auto components sector have been very different.

South Africa's policy frameworks for developing a globally competitive auto industry took the form of the Motor Industry Development Programme (MIDP), which ran from 1995 to 2012, and the subsequent Automotive Production Development Programme (APDP), from 2012 to 2020. Neither the MIDP nor the APDP achieved the expected development of the local industry with South Africa's production of assembled automobiles only accounting for 0.65 per cent of the global market. The levels of local content in the domestic automotive industry have remained low (Chapter 5). The rebate mechanism, which allowed the OEMs to increase imports of components as long as exports were also increasing, has been the chief policy weakness, as it has undermined the increasing of local content (Black et al., 2018). For example, in 2016, as much as 60 per cent of the components used in production in South African plants were imported. Other factors contributing to this are low domestic and regional demand of assembled automobiles in the domestic industry.

The political economy dynamics in South Africa have not been supportive of the development of the automotive industry, especially automotive components. The South African state has failed both to realize its developmental agenda and to reconcile it with the interests of the global assemblers. While the state has assumed an interventionist role in the auto industry, this has meant that the MNCs have been in a strong bargaining position with the state for incentives, given their hegemonic positions in the local supply chain (Black et al., 2018). The South African automotive components industries have been reliant on the strategies of the multinational assemblers.

The experience in South Africa has led to the Auto Masterplan 2035, launched in 2020, which was largely inspired by the Thai version. Under this framework, the state is seeking to achieve local-content levels of 60 per cent across all assembled vehicles as well as doubling employment levels in the sector and

increasing its competitiveness. It is too soon to comment on the success of the strategy.

With regards to the development of automotive components, poor coordination among different government departments responsible for executing policy incentives in the 1994–2019 period has further undermined this development. The National Industrial Policy Framework (2007) and the iterative Industrial Policy Action Plans (IPAPs, 2010–19) have sought to leverage linkages to the growing automotive industry to develop plastic automotive components. However, the political economy dynamics have not been supportive of this. For example, the local compounding industry, which produces automotive polymer grades was undermined by polymer pricing (discussed further below). An analysis of the cost competitiveness of the local industry showed that while the conversion cost and additive costs were comparable with global compounders, the local firms were paying 30 per cent more for polypropylene, which accounted for 80 per cent of the raw material cost (Mondliwa, 2018). The result is that, over time, the compounding level of the value chain lost competitiveness and firms largely exited the market. This meant the automotive plastic converters have had to switch to imported automotive grade polymers, which has obviously reduced the local content of the plastic components and, in turn, the incentive for assemblers to source locally.

The funding and incentive programmes have also reinforced South Africa's sub-sectoral composition rather than targeting the sub-sectors that the country was seeking to develop, such as automotive components (Beare et al., 2014).

4.5 Leveraging Backward Linkages to Polymers

To assess how interests have supported or undermined development along linkages between upstream polymers and downstream plastic products, this section examines industrial policy, market power, and governance dynamics along the value chain in South Africa.

4.5.1 The Role of Industrial Policy in Supporting Linkages and Structural Transformation

Structural change requires industrial policy to support the development of capabilities in new activities rather than allocating resources in line with the existing economic structure. For successful structural change within the plastic products value chain, industrial policy has an important role to play to support the more diversified plastic products industry including higher value added and more sophisticated goods, such as automotive components. Despite the

prioritization of the plastic products industry, from 2007, by the Department of Trade, Industry, and Competition (DTIC), incentives have continued to disproportionately flow towards the upstream basic chemicals production—suggesting that the distribution of power within the economy does not support diversification. The section considers the distribution of industrial incentives between 1994 and 2007 (the year that the National Industrial Policy Framework was launched), and then in the period between 2007 and 2019.

In the 1994–2007 period, while there was no overarching industrial policy, a range of industrial policy support measures such as development finance and export incentives were made available to firms. These included loans extended by the Industrial Development Corporation, the General Export Incentive Scheme running from 1994 to 1997, and various tax incentives for investment. These measures were disproportionately awarded to the upstream firms, including Sasol. For example, Sasol received the lion's share of financing provided to the chemicals and plastic products industry grouping (Mondi and Roberts, 2005; and Gumede et al., 2011). Sasol was already internationally competitive by 1994 and able to finance further investments from its profits (Bell et al., 2019). This bias towards upstream producers continued in the 2000s, as Sasol alone received 22 per cent of the entire Strategic Investment Programme (SIP) incentive programme (Mondliwa and Roberts, 2019). Other beneficiaries were upstream basic steel industries. Very few plastic products firms benefited from these incentives. This distribution of incentives reinforced the economic structure rather supporting diversification.

Though the plastic products industry was prioritized in the post-2007 period, this did not result in substantial support for the industry. Instead, in terms of incentives and initiatives, most support continued to be biased towards upstream firms. Where the industry has benefited from government incentives, these have tended to go towards larger firms, primarily in the packaging industry (Beare et al., 2014; IPAP, 2016). This means that industrial policy has not supported diversification within the plastic products industry, but has instead reinforced the existing structure.

It was only in 2019, that the Industrial Development Corporation (IDC) developed a targeted scheme for the downstream plastic production industry. Though this is an important development, finance alone is not the silver bullet for changing industry performance. Other factors and conditions need to be in place, including competitively priced inputs and the ability to source appropriate technology, such as machinery and moulds. Clusters initiatives are an important part of collective action to address common challenges relating to skills and capabilities. In 2016, a cluster programme was developed by the DTIC for this purpose and firms in the plastic products industry applied for cluster development support. However, the programme was shelved due to lack of funding.

While the DTIC has developed 'sector strategies', the success of these strategies depends on the coordination of interventions among the different departments

overseeing the different areas, such as technology and skills development (Mondliwa, 2018). As a result of poor cross-department coordination, many of the interventions identified in the sector strategies have not been implemented.

4.5.2 Industrial Policy, Economic Regulation, and Implications for Market Power

Diversification in the plastic products value chain has not only been undermined by poor support for the development of capabilities in downstream plastic production. The significant support provided to Sasol, accompanied with weak or no conditionalities, has further entrenched the firm's market power and undermined the bargaining power of downstream firms.

A product of the planning legacy of apartheid, Sasol is the dominant petrochemicals producer in South Africa, including of monomers and polymers. Acknowledging the implications of Sasol's dominant position for price negotiations with downstream industries, the apartheid government placed a number of conditions on the provision of state support and a favourable regulatory regime for liquid fuels. One condition required Sasol to sell intermediate chemical inputs, including polymers, at export parity levels (as determined to be the competitive level), and to support the growth of the downstream industries in other ways, such as through advice and technical support (Roberts and Rustomjee, 2009). But, instead of continuing the stance of applying strong conditionalities, in the post-apartheid period decisions taken by regulators and policymakers have been characterized by weak reciprocal mechanisms, or none at all. Sasol changed its pricing around 2002 once it became evident that it was not going to be held to commitments. As discussed below, this coincides with a decline in the performance of the downstream plastic products sector (Figure 4.2).

Two features of the post-apartheid policy regime stand out. First, the approach to fuel regulation from 2003 onwards has assumed away Sasol's vertical integration and the potential leveraging of market power from one product market to another. Price regulation applies only to fuel, and the chemical co-products that arise in fuel production are not regulated. This creates opportunities to extract monopoly prices in the unregulated product markets. At the same time, the upstream petrochemical activities have continued to benefit from a range of inherited advantages and regulations. These advantages filter through to the chemical co-products, such as monomers, which are priced at fuel alternative-value.[5] The generous fuel regulation means that downstream industries pay higher prices for co-products and by-products (Mondliwa et al., 2020).

[5] The imputed return to the product, if it were converted into fuel components, even while there are limits to the extent to which this could be done in practice.

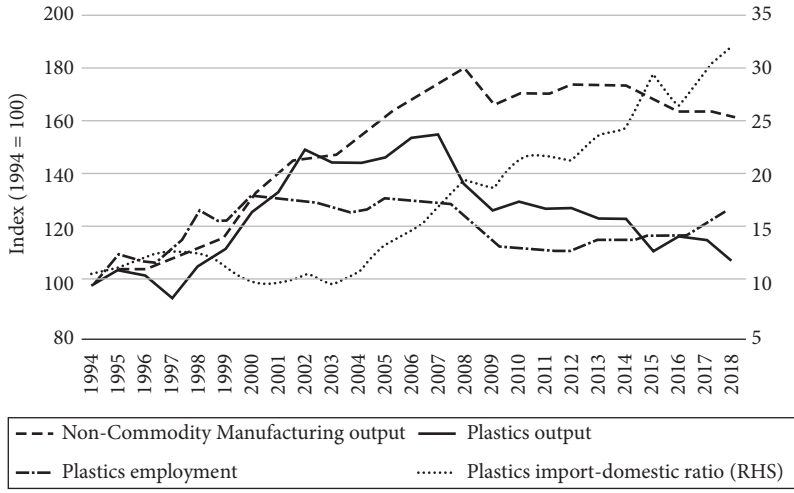

Figure 4.2 Turning point in the performance of the plastic products industry
Source: Authors' calculations using Quantec data.

Second is that there has been limited enforcement of conditionalities. For example, Sasol holds mineral rights to coal, which is used as an input for synthetic fuel production. The standard coal licence contains a condition that precludes price discrimination between domestic and export markets for coal and products beneficiated from coal. However, this condition has never been enforced for chemical products that are beneficiated from coal by Sasol. Another example is the condition placed on Sasol's release from repaying windfall gains from past regulation. Here, Sasol has committed to support and develop the downstream activities of the petrochemical value chain (Mondliwa and Roberts, 2019). However, rather than building strategic vertical partnerships with its customers for the development of new products, Sasol has instead taken a corporate social responsibility approach to the 'support for growth and competitiveness of the downstream sector' by establishing an incubator, which the government co-funded (Mondliwa and Roberts, 2019).

The state has therefore not succeeded in re-orienting Sasol's strategies to support downstream industry development. Sasol on the other hand has leveraged its market position to maximize its profits. The internationalization of the firm through its listing on the New York Stock Exchange in 2003, has also meant that these profits are increasingly distributed outside of the country as dividends (Chapter 10).

4.5.3 Input Linkages and Value Chain Governance: Pricing Power

Sasol has leveraged its market position to influence distribution of value in the value chain. The firm's vertical integration from the monomers to the polymers

level of the value chain has allowed it to influence pricing outcomes in polymer production. Sasol is both the monopoly supplier of monomers (the input in the production of polymers) and the competitor to Safripol (the only other producer of polymers) in the supply of polymers. Sasol has been able to influence Safripol's pricing strategies in two ways. First, by limiting access to monomers, it has restrained Safripol's ability to expand and compete more aggressively with Sasol (Mondliwa et al., 2021). This has been done by adopting a pricing structure that resulted in higher prices as volumes increase. Collusion has also played a part, as Sasol and Safripol entered into a coordinated arrangement, which had the impact of indirectly fixing the polymer prices in the country based on Sasol's position as the monopoly monomer supplier.

Second, Sasol placed a condition on the 'gas to liquids' technology licence to PetroSA, precluding the state-owned firm from selling chemical co-products in the domestic market for the first twenty years of the licence agreement. This has effectively removed a potential competitor from the market, further entrenching Sasol's market power.

The impact of polymer pricing strategies on the performance of the plastic products industry can be observed in relation to the response to Sasol's change in pricing strategy in 2002/3. Between 1994 and 2002, when polymer prices continued to be priced at the required export parity levels as part of the historical conditions for state support, the plastic products industry performed reasonably well, with output growth in line with other diversified manufacturing production up until 2002 (Figure 4.2). However, 2002—when Sasol changed its pricing strategy from export parity to import parity—marked a turning point. It was then that the performance of the downstream plastic products industry started to lag that of other diversified manufacturing industries, with a marked decline in competitiveness and import penetration increasing, to reach 34 per cent by 2019 (Figure 4.1).

Input pricing is important for the wider development of capabilities, as the investments to build production and technological capabilities—necessary for becoming internationally competitive—are undermined by the input price effect on margins and profitability of downstream businesses. In plastic production in particular, the pricing of polymers is crucial for cost competitiveness, as polymers account for 50 to 70 per cent of variable production costs (Machaka and Roberts, 2003; Dobreva, 2006; Beare et al., 2014; Mondliwa, 2018). Though the pricing of the input may not be the only factor that led to the decline in competitiveness of industry, it is certainly an important one given that polymer inputs make up the largest component of variable cost.

Input linkages are not only important for input cost competitiveness: certain aspects of the innovation of plastic production require collaboration with polymer producers who are able to adapt the performance of polymers to specific design requirements. Since the days when Sasol was required to provide technical support to the downstream plastic industry there has been far less collaboration.

In order for industrial policy to succeed in driving development through linkages, it is important that it grapples with the vertical relationships in value chains, including the power distribution. This allows the policymaker to design policies that can tip the scales for large and lead firms like Sasol to work with downstream industries to develop capabilities and competitiveness.

4.6 Conclusions

At the core of structural transformation is diversification of an economy, generally based on linkages to support cumulative productivity increases. In the case of South African plastic products, this crucial development has been undermined by market power in the upstream petrochemicals industry, meaning high input prices, which are critical for the competitiveness of the industry as well as for building capabilities. The price pressures on an intermediary input product (polymers), have resulted in smaller margins, meaning that firms are unable to reinvest in up-to-date equipment and research and design, all of which are critical for building productive capabilities. These firms may find themselves in a vicious circle of competitiveness with low margins, low investment, and little development of capabilities.

With regards to the comparative analysis of Thailand and South Africa's automotive plastic components, the chapter highlights how, despite South Africa and Thailand both having policy frameworks to support automotive value chains, these have led to very different outcomes. This speaks to the importance of the design of industrial policy as well as the political economy dynamics that can support or undermine such policies. However, state policies alone do not provide a full explanation for either Thailand's relative success, nor South Africa's relative failure. The factors that explain the different trajectories include: the combination of vertical with horizontal integration in the form of participation in GVCs and the clustering effects which differed in the two countries; the presence of a larger and growing regional market for Thailand; and, a different role played by MNCs—Japanese firms in the case of Thailand. From a policy perspective, better coordination and more focused policy objectives also appear to have played an important role in Thailand's accumulation of technological capabilities and the development of deeper intersectoral linkages.

The complex and sometimes contradictory political economy dynamics in South Africa have been an important contributing factor in undermining the development of linkages. As the discussion has shown, in the period up to 2006, policy continued to support the upstream firms such as basic chemicals, with the lion's share of government incentives being channelled to these industries. Since 2007 onwards, industrial policy instruments have been deployed to target the plastic products industry and attempted to link the plastic automotive components to

the automotive industry. However, poor coordination among multiple government departments and agencies has further weakened these initiatives.

The opportunity for 'linking back' into the domestic economy from automotive GVC participation has been further undermined by poor collaboration between firms, weak relationships with institutions that could support capabilities development, and conflicts within the value chain.

The chapter emphasizes the importance of understanding the performance of the plastic industry within the broader sectoral value chain. In the analysis of push dynamics from backward industries, it is shown that competitive outcomes at one level of the value chain can impact on the development of sectoral value chains. This happens through vertical linkages, which have the potential to promote or undermine structural transformation (see also Lee et al., 2018; Mondliwa et al., 2021). And crucially, as Zingales (2017) notes, the market power of firms translates easily into political power, which allows dominant firms to influence regulations and policy in their favour.

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