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WIDER Working Paper 2017/49

Towards the integration of markets

Competition in road transportation of perishable goods between
Malawi, South Africa, Zambia, and Zimbabwe

Thando Vilakazi¹ and Anthea Paelo²

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Abstract: Rapid urbanization and rising income levels in Southern Africa have increased the consumption of perishable and processed food products. This paper relies primarily on firm-level interview data to assess competition and bottlenecks in transporting time-sensitive perishable products across borders between Harare, Johannesburg, Lilongwe, and Lusaka. High transport prices in 2015—almost double the benchmark rates applied and rates for transportation of commodities—are partly explained by concentration in Malawi, Zambia, and Zimbabwe, and lack of return loads to Johannesburg. Rates could be significantly reduced through a platform for coordinating access to return loads, reducing delays at borders, and effectively implementing pre-clearance procedures.

Keywords: road transport, perishable goods, cross-border transport, competition, Southern Africa

JEL classification: D40, F15, L1, L50, L91, L92

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1 Introduction

This research focuses on understanding competitive dynamics in the road transportation of perishable goods between Malawi, South Africa, Zambia, and Zimbabwe. High levels of economic growth, rapid urbanization, and rising income levels in Southern Africa ('the region') have led to increases in the consumption of fresh and processed food products and consumer goods.

This paper is concerned with transportation by road between the major urban hubs that have seen rapid growth in recent years or where there is significant potential for growth—specifically, Harare (Zimbabwe), Johannesburg (South Africa), Lilongwe (Malawi), and Lusaka (Zambia). The majority of perishables consumed in the region originate from South Africa, which has important implications for trade flows and transport rates as discussed herein. In most cases, logistics chains are designed to meet the needs of large (South African) retail groups operating in the region.

Southern Africa has experienced a proliferation of supermarkets in the last ten years driven mostly by the growth of South African retail chains Shoprite Checkers, Pick n Pay, and Spar (das Nair and Chisoro 2015). This growth has been spurred by demand-side factors such as high rates of urbanization, the increased participation of women in the workforce, higher per capita incomes, an expansion of the middle class, and reduced costs and prices due to economies of scale, as well as increased foreign direct investment (KPMG 2015). In 2010, household expenditure on vegetables, fruit, meat, fish, and dairy products comprised just under 50 per cent of total household spend on fast-moving consumer goods (FMCG) in Africa (KPMG 2015).

Supermarkets are relevant because they act as a one-stop location for customers to purchase a mixed bundle of household goods and food items including perishables, making them a key route to market for producers. In the region, the supermarket groups tend to import goods from South Africa. For example, Pick n Pay Zimbabwe imports about 80 per cent of its household goods and 70 per cent of its dairy products from South Africa while Pick n Pay Zambia imports about a third of its products from South Africa.¹ Therefore, the supply chain for the transportation of perishables across borders has become even more important as it requires efficient, specialized methods of transport to ensure speedy and efficient transfer of products from the source, to the warehouse, to the supermarkets or other outlets. In the case of perishables, this is commonly referred to as cold chain logistics, wherein cold storage and refrigerated transport are critical to ensuring that products are in an acceptable condition for sale upon arrival at the destination. Transportation of perishable goods requires efficient cold chains and just-in-time logistics systems.

In total, 32 interviews were conducted in Malawi, South Africa, Zambia, and Zimbabwe and these are relied upon in the paper as the primary source of data, along with reference to secondary data and information from previous studies. A second paper forming part of this research assesses competition in the transportation of commodities in the region (Vilakazi and Paelo 2017). Understanding competition in this wider market segment is important given increased trade flows and the fact that commodities and light manufactured goods form an important part of the trade flows in the region, with significant potential for further growth through industrial development strategies. The findings of the two papers are thus complementary in terms of identifying key bottlenecks that affect all transportation, and specific issues relating to refrigerated transport as a niche segment that is critical for meeting growing food production and consumption in countries

¹ Unpublished interview conducted with Pick n Pay by Reena das Nair and Shingie Chisoro on 3 August 2015. See das Nair and Chisoro (2015).

in the region. Overall, the project seeks to understand the potential for and constraints on greater intra-regional trade as part of regional industrial development. Efficient transport networks are critical to unlocking trade between countries in the region, especially in sectors of production and consumption growth such as the food industry. It is thus important to assess, at the firm level, the interactions between transporters and other key players in the logistics value chain, and competitive outcomes in the market for the transportation of perishables in particular—an area which is significantly understudied in the context of the region.

The key research question assessed in this paper is: what is the impact of road transport on intra-regional trade and integration of markets for perishable food products? The paper focuses on the following specific areas:

- What is the nature of competition in road transport for perishable products?
- What are the primary drivers of road freight prices and costs for perishable goods along the North–South corridor? How do prices and costs compare for perishable food products and commodities?
- What are the requirements of large supermarket chains and retailers in terms of the transportation of fresh and processed foods as part of their supply chains to different hubs of consumption growth in the region?
- What interventions are necessary to optimize the linkages by road between major hubs of production and consumption for perishable goods?

Our key findings are that transport rates would be significantly lowered by specific interventions in co-ordination of transport to optimize the use of trucks which would otherwise return empty to South Africa. The reduction of delays at the border (which can cost US\$400 a day using conservative estimates) could be achieved through both large-scale and smaller interventions (such as interoperability between clearing systems). Pre-clearance systems which have improved outcomes in terms of border procedures are indicative of the potential gains from co-ordination in systems between countries. The market for the transportation of perishable goods is, however, constrained by the unavailability of return loads from countries outside South Africa, and low levels of demand for refrigerated transport in domestic markets in the region, which lead to disinvestment and concentrated transport markets. As such, rates for refrigerated transport are significantly higher than cost benchmarks, with high margins across countries.

The paper is structured as follows: Section 2 reviews relevant literature and secondary information on refrigerated transport in the region; Section 3 outlines the methodology applied in the research; and Section 4 reviews the data on trade flows between the focus countries. Section 5 reviews the structure of markets in each country and the requirements of customers, and Section 6 considers competitive outcomes in terms of the prices charged for refrigerated transport and the main cost drivers. Section 7 discusses cross-cutting issues and outlines the main recommendations and key areas for intervention.

2 Review of literature on retail and logistics of perishable goods in the region

This section considers four key areas of literature on transport and logistics in the region. Logistics and cold chain systems are characterized in general and in the context of the region. In addition, available literature on transport prices and costs is considered, as well as that on aspects of logistics systems and quality of service.

2.1 Defining logistics systems and cold chain logistics

Logistics encompasses a broad set of activities and functions related to the transportation of goods. Transport costs and prices are generally viewed as a subset of the logistics function, although of course a significant component. In the context of the transportation of diversified goods, it is important to consider not only cost and price parameters, but also the broader set of systems and participants involved in the supply chain. A useful definition is provided by Teravaninthorn and Raballand (2009: 3), describing logistics as follows:

the process of planning, implementing, and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods, and related information from point of origin to point of consumption. In other words, logistics costs encompass a much wider range of activities than do transport costs and include transaction costs (related to transport and trade processing of permits, customs, and standards), financial costs (such as inventory, storage, and security), and nonfinancial costs (such as insurance).

This description of logistics systems is akin to the concept of supply chain management in so far as both concepts encompass flows and systems involved in the movement and handling of goods from origin to destination. Supply chain is a broader concept that deals not only with the flow and storage of goods, but also aspects of the production and procurement process. Kaminsky et al. (2007; referenced in Felea and Albăstroi 2013: 80) define supply chain management as:

a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system wide costs while satisfying service level requirements.

It is essentially the organization of the processes required to get a product to the final consumer, right from sourcing of raw materials through to manufacturing, storage, and transportation to the store efficiently, timeously, and with minimal cost. This research focuses primarily on transportation from producers, distribution centres, and stores in one urban hub to those in another, assessing in detail the competitive dynamics between transporters in this process.

Cold chain logistics requires the maintenance of perishable goods in a temperature-controlled environment throughout the process of transport and storage until the goods reach the final consumer. Specific products have different requirements in terms of the temperatures required to achieve appropriate shelf-life and to meet international standards (CFCFA 2014), although the same refrigeration technologies can generally be used across products due to the ability to adjust temperatures. Technologies typically used in maintaining optimal temperatures include dry ice, gel packs, eutectic plates, liquid nitrogen, quilts, and reefers (Rodrigue and Notteboom 2014).

Reefers are insulated transport units designed to allow temperature control. In the region, units can be in the form of a refrigerated container loaded on a flatbed trailer, or a refrigerated trailer attached to a truck or other towing vehicle. The reefer maintains the temperature of the produce for the duration of the journey and may even be used as temporary storage while waiting for transfer. When using a trailer, the cold unit is usually run separately from any vehicle towing the unit using diesel, and thus it costs an additional amount in terms of fuel expense to power the air-conditioning unit. Refrigerated containers or 'lift offs' are equipped with power units which operate using a battery capable of lasting up to 11 days. It is also possible to operate an insulated

box or tube which does not require an energy source and instead maintains the produce at a particular temperature.

2.2 Refrigerated transport and cold chain logistics in the region

In sub-Saharan Africa, cold chain logistics is as much as nine times more expensive than in the rest of the world (Eberhart Capital 2015). The Food and Agriculture Organization (FAO) estimates that enough food to feed 300 million people in Africa is lost due to food spoilage, resulting in a 15 per cent reduction in the income of small farmers in sub-Saharan Africa (Eberhart Capital 2015). It has been estimated that over 50 per cent of fruit and vegetables grown in Africa is lost due to spoilage (Oppelt et al. 2015). Whereas in industrialized countries most of the waste occurs at the consumer level, in developing countries the loss occurs primarily during harvesting, processing, and distribution. For dairy products, developing countries only experience a loss of 5 per cent during post-harvest, processing, and distribution, and an additional 15 per cent at the consumer level (Oppelt et al. 2015). However, in sub-Saharan Africa poor post-harvest procedures result in a combined loss of about 25 per cent of produce, with the distribution stage contributing up to 10 per cent of the loss (Oppelt et al. 2015). Some of the reasons provided for this significant spoilage include the high cost of cold chain logistics due to poor technology, lack of automation, and poor infrastructure (Eberhart Capital 2015).

Given the systems, infrastructure, and technology required to maintain the cold chain, a number of integrated transport companies are now evolving to provide bundled services in handling perishable goods, including traditional transport, warehousing inventory management, and sourcing of products (Bloem 2015).

South African companies are the dominant players in refrigerated transport in Southern Africa; this may be due to the presence of large South African retail chains in the region (Oppelt et al. 2015). South Africa's economy and scale of production for certain perishable goods is also several times larger than those of its neighbouring countries.

Fruits account for around 50 per cent of all agricultural exports from South Africa (Goedhals-Gerber et al. 2015), and 99 per cent of fruit loads in general are transported by truck from the fruit production regions to ports (Brodie 2015). Capacity for rail transport is low, and rail is also inflexible where goods need to be transported to warehouses and then to a supermarket or other final destinations. In Africa, about 70–90 per cent of agricultural produce (including perishables) is transported by road (World Bank 2015).

2.3 Transport prices and costs in the region

Several earlier studies have found poor outcomes in terms of the prices for road transport in Africa. Transport prices and costs in sub-Saharan Africa have generally been found to be higher than in other regions in the rest of the world due to poor road infrastructure, high fuel prices, and delays caused by customs procedures (Raballand and Macchi 2008; Rashid and Minot 2010). Transport rates have been recorded at between US\$0.04 and \$0.10 per km per ton for long-distance road transport and between \$0.10 and \$0.40 per km per ton for short-distance transport, compared with \$0.03 to \$0.04 in Pakistan and OECD countries (Rashid and Minot 2010).

Transportation costs can contribute up to 27 per cent of the wholesale price of food products (Minten and Kyle 1999). Poor road infrastructure contributes to a higher cost of transport,

although this has become less of a constraint in achieving efficient transport on major trunk routes (Teravaninthorn and Raballand 2009).

Delays caused by customs procedures are costly in relation to the value of goods. A delay of one day in inland transit times in sub-Saharan Africa can reduce export values by about 7 per cent (or a 1.5 per cent drop in all importing-country tariffs), an effect which is heightened for time-sensitive goods (Freund and Rocha 2010).

Furthermore, regulation which favours domestic transport firms over foreign firms, as well as a low level of competition in the industry, may also contribute to high transport costs (Rashid and Minot 2010).

2.4 Logistics systems and quality of service

The timeliness and reliability of delivery in logistics is critical in the transportation of perishables, given the time- and temperature-sensitivity of the products. Rodrigues and Potter (2013) compare logistics markets for FMCG in South Africa and the UK. FMCG covers goods such as food, drinks, and toiletries for which supply chain management processes are known to be especially efficient relative to other goods (Rodrigues and Potter 2013). The authors compare logistics systems by assessing performance in both primary distribution (movement of goods from suppliers to distribution centres or stores) and secondary distribution (movement of goods from distribution centres to stores) based on focus group interviews with market participants and case studies. The findings of the study are that the main causes of uncertainty in road freight logistics (common to each country) were delays, variable demand and inaccurate forecasts, delivery restrictions, and the lack of supply chain co-ordination and integration (Rodrigues and Potter 2013: 361). Delays included road congestion and loading and offloading delays; restrictions included tight and rigid delivery timelines; and supply chain aspects were affected by the flexibility of the carrier. Interestingly, in South Africa the ‘extra distance’ associated with each of these arose through vehicles returning to correct mistakes. Furthermore, in South Africa there was an emphasis on on-time delivery such that trucks loaded at distribution centres often had to leave to make a delivery even if the load was not fully on board. The authors only considered within-country dynamics, but there are additional factors that have a bearing on cross-border transportation, such as, for example, border processes and the fact that over longer distances, and with larger consignments, the likelihood of transporters returning to correct errors is extremely low.

While the findings of Rodrigues and Potter (2013) are quite specific to the markets studied, they highlight some important aspects of ‘service quality’ that are expected to be required in the transportation of time-sensitive, perishable products across borders. Zamparini et al. (2011) consider the relative importance and the monetary values attached to freight transport quality attributes by shippers in Tanzania. The five variables considered in assessing aspects of service quality were flexibility, frequency, loss and damage, reliability, and transit time. The authors find that shippers consider travel time, loss and damage, and frequency to be the most important aspects of the quality of service of freight transport systems. We draw on the factors identified in these studies in the assessment below.

The World Bank Logistics Performance Index (LPI) is a benchmarking tool designed to measure a wide range of factors relating to quality of service in logistics systems. The index comprises six main dimensions, as follows (World Bank 2014):

- The efficiency of customs and border management clearance

- The quality of trade and transport infrastructure
- The ease of arranging competitively priced shipments
- The competence and quality of logistics services — trucking, forwarding, and customs brokerage
- The ability to track and trace consignments
- The frequency with which shipments reach consignees within scheduled or expected delivery times

In terms of the focus countries, South Africa ranks the highest in the overall LPI scores, followed by Malawi (Table 1). Zambia and Zimbabwe rank behind South Africa and Malawi, and have similar scores overall. It is worth noting that Malawi seems to perform well in terms of customs procedures and road infrastructure measures, as well as logistics quality.

Table 1: Logistics Performance Index scores and rankings, 2014

	Malawi		South Africa		Zambia		Zimbabwe	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Overall LPI score	2.81	73	3.43	34	2.46	123	2.34	137
Customs	2.79	62	3.11	42	2.54	86	1.89	154
Infrastructure	3.04	48	3.20	38	2.31	115	2.25	123
International shipments	2.63	108	3.45	25	2.13	152	2.25	143
Logistics quality and competence	2.86	70	3.62	24	2.47	114	2.50	108
Tracking and tracing	2.63	100	3.30	41	2.47	120	2.22	143
Timeliness	2.99	100	3.88	33	2.91	105	2.93	104

Source: World Bank (2014).

Zimbabwe and Zambia rank poorly on international shipments, which may partly be a consequence of the fact that they are landlocked countries and as such may rely on the logistics systems in other countries, including efficiencies at ports, to facilitate shipments. This area is also where Malawi's scores are the poorest, given that the country is also landlocked.

3 Methodology and data collection

The research relies on in-depth interviews with various participants in the road transport industry in each country. In total, 32 interviews were conducted in Malawi, South Africa, Zambia, and Zimbabwe. The participants included truckers/transporters, clearing and forwarding agents, and industry associations, as well as the different buyers of transport services including retail chains. We also rely on secondary information and desktop research in the assessment.

It is clear from the enquiries that there is a lack of comparable and consistent data on prices and other costs involved in transporting goods across borders in the region. Face-to-face interviews have therefore been a critical source of information, and the research has relied on triangulating information from various sources.

Questionnaires specific to each of the relevant groups of interviewees were drafted and used as guidelines for obtaining the relevant information from the respondents. During the interview process, the questions were adapted to better suit particular interviewees and country context where necessary, and to match the information gained from the preceding interviews. The

interviews lasted an hour on average, at the premises of the interviewees. In some cases, telephone conversations and follow-up emails were used either to confirm information received or to request further input.

The participants identified for the study were chosen by means of desktop research from publicly available sources as well as using recommendations and referrals from the participants themselves. The road transport associations in particular were very helpful sources of information and referrals, and assisted with descriptions of how the industry has functioned and evolved, the different parties involved, and the roles of and dynamics between individual actors. However, the approach was to rely on information received from the actual firms themselves in assessing aspects of price and costs, for example, as they are in a position to provide accurate data in this regard.

Information obtained in other Centre for Competition, Regulation and Economic Development (CCRED) studies on transportation in the region and in other concurrent research forming part of this project was also drawn upon to inform the interviews and analysis.²

4 Trade flows

South Africa's exports of processed food products to Southern African Development Community (SADC) countries grew by more than 200 per cent between 2005 and 2015, while imports of these products from other countries in the region to South Africa remained negligible (Vilakazi and Paelo 2017). In this period, the growth in exports of 'food and kindred products'³ exceeded growth in exports of any other category of manufactured exports from South Africa—led by growth in processed food exports (Vilakazi and Paelo 2017). This is primarily due to increased levels of demand in the SADC region as income levels rise, combined with high rates of urbanization and the linked expansion of South African retail chains in the region, amongst other factors (das Nair and Chisoro 2015).

Trade flows of various perishable food products are also significantly skewed towards exports from South Africa to the other countries. Imports of perishables to South Africa from each of the other countries are negligible in terms of value, which has important implications in terms of (lack of) return loads and the transport rates charged in the market, as we discuss in sections to follow.

A large proportion of exports from South Africa are conducted by the large retail groups for supply to their stores in each country. There are also relatively small domestic retail outlets and chains in each focus country that import certain fresh, frozen, and chilled products from South Africa along with various FMCG.⁴ The smaller chains (that import for a few stores and less regularly) may mix loads, including goods requiring different temperatures in one truck load or container by inserting separators in the refrigerated vehicle that maintain each compartment at the correct temperature.

² See, for example, das Nair and Chisoro (2015) and Ncube et al. (2015).

³ IUT20: Food and kindred products [SIC20]: This major group includes establishments manufacturing or processing foods and beverages for human consumption, and certain related products, such as manufactured ice, chewing gum, vegetable and animal fats and oils, and prepared feeds for animals and fowls. Products described as dietetic are classified in the same manner as non-dietetic products (e.g., as candy, canned fruits, cookies).

⁴ Unpublished interview conducted with OK Zimbabwe by the authors on 30 September 2015; unpublished interview conducted with Chipiku Plus by the authors on 14 October 2015; unpublished interview conducted with City Supermarket by the authors on 14 October 2015; unpublished interview conducted with Sana Cash n Carry by the authors on 14 October 2015.

Particularly for the small retail groups in each country, there is some proportion of fresh fruit and vegetable and meat products that is sourced locally, while items that grow all year in South Africa and certain fruit products that are unavailable in each country are brought in from South Africa.⁵

In this context, the composition of South African exports of perishable goods is interesting given different demand factors in each recipient country. Total South African exports (of selected product categories at the HS-code, 2-digit level⁶) to each of the other countries considered in this study grew between 2010 and 2015 (Table 1 Table 2). Exports to Zimbabwe were the largest throughout this period, which is linked to the fact that domestic production capacity had been reduced during the decade of economic difficulty in the country. Exports to Zimbabwe peaked in 2010, but remained around the same levels from 2011 onwards. The peak in 2010 (which started in 2009) related to a sharp increase in imports of all perishable products from South Africa as economic growth improved significantly in 2009 and 2010. The largest increases were in meat and dairy products.

Imports by Zambia grew considerably in this period as well. The compound annual growth rate (CAGR) from 2010 was 10.6 per cent and actual value of imports almost doubled between 2010 and 2015. Imports by Malawi have also nearly doubled in this period, albeit from a very low base (CAGR of 11.1 per cent). For Zambia, the most significant growth was in fruit and vegetable imports. For Malawi, growth is led by increases in imports of meat and fruit products.

Table 2: Total South African exports of various perishable goods to Malawi, Zambia, and Zimbabwe (millions, US\$)

	2010	2011	2012	2013	2014	2015
Malawi	3.3	3.4	3.7	5.0	6.0	6.2
Zambia	17.6	19.7	24.5	32.8	34.0	32.2
Zimbabwe	63.0	54.1	50.2	48.2	47.4	47.4

Source: Quantec (n.d.).

Tables A1, A2, and A3 in Appendix 1 show South African exports of the various perishable products (by HS-code) to Malawi, Zambia, and Zimbabwe, respectively. The most significant trends in trade flows are as follows:

- Thirty-seven per cent of the total exports of meat products from South Africa to the other three countries are of poultry and related meats.
- Exports of dairy products are highest to Zimbabwe (just over US\$26 million in 2015). Dairy products are the primary import for Zimbabwe, although there has also been significant growth in imports of fruit and related products from South Africa.
- Exports of vegetables and fruit to Zambia have grown significantly (albeit from a relatively low base) by around 6 per cent and 9 per cent respectively, from levels in 2005. The growth in the fruit category has been the most significant.

⁵ Unpublished interview conducted with OK Zimbabwe by the authors on 30 September 2015; unpublished interview conducted with Chipiku Plus by the authors on 14 October 2015; unpublished interview conducted with City Supermarket by the authors on 14 October 2015; unpublished interview conducted with Sana Cash n Carry by the authors on 14 October 2015.

⁶ Total exports in five categories are included: H02: Meat & edible meat offal; H03: Fish & crustaceans; H04: Dairy produce; H07: Edible vegetables & certain roots & tubers; and H08: Fruit & nuts.

- Imports of dairy are the highest for Malawi (although relatively small), followed by fruit and meat products.

Although growth has been led by imports of different products for each country, each category of products is transported largely by road trucks, and is thus relevant for our assessment herein. The imbalance in flows means that exports from South Africa will have a higher transport rate in general, compared to the return leg back to South Africa, as discussed below.

5 Key characteristics of the cross-border refrigerated transport market in the region

In the region, South African truckers transport the majority of loads for perishable goods as discussed. Refrigerated transport markets in the other countries are concentrated amongst a few major transport companies. Although there may be a number of smaller operators (one to ten reefers) in the market, the largest loads and contracts for major retailers, for example, are agreed with large multinational transport brokers and forwarding companies, as well as the main transport companies. The large logistics groups are also integrated into storage, transport, and supply chain management.

Trade of perishable goods is heavily skewed towards imports from South Africa, particularly amongst large retail groups and locally based traders.⁷ This means that return loads are typically not available, in particular for South African truckers delivering loads in the other major cities, particularly given limitations on the products which can be transported in specialized reefers. This results in very high rates of transport, as the costs of the return leg are placed on the rate charge for the first leg.

It is not viable for a transporter from outside of South Africa to drive an empty leg to Johannesburg to search for refrigerated loads unless the loads have already been secured; only some of the larger transport companies have agents and satellite offices set up in Johannesburg to assist with securing loads. Therefore, South African transporters are acquired in most cases, sometimes through brokers, to transport loads from South Africa to neighbouring countries. In addition, the South African retail groups prefer to use known operators from South Africa. The effect of these factors is that demand is high for transport on the export leg from South Africa, truckers from countries other than South Africa do not obtain an adequate share of loads and thus leave the business, and there is thus limited rivalry in the regional market as a whole.

Normal flatbed trucks are generally not considered to be adequate substitutes for reefers or insulated units when transporting perishable goods, and the market is thus a niche subsector of transport services. However, between certain of the hubs, namely Johannesburg–Harare, where distances are relatively shorter, there has been a practice recently of using non-refrigerated vehicles to transport fruit, although this is in fact illegal due to pest (codling moth) risks.⁸ The rates charged for using refrigerated trucks are much higher than those for the regular trucks typically used for transportation of various commodities. Therefore, some vendors and wholesalers bypass this

⁷ Unpublished interview conducted with OK Zimbabwe by the authors on 30 September 2015; unpublished interview conducted with Chipiku Plus by the authors on 14 October 2015; unpublished interview conducted with City Supermarket by the authors on 14 October 2015; unpublished interview conducted with Sana Cash n Carry by the authors on 14 October 2015.

⁸ Unpublished interview conducted with Fresh Produce Marketing Association of Zimbabwe by the authors on 2 October 2015.

regulation (including through bribes to officials) to bring in fruits such as apples, pears, and grapes (that are grown throughout the year in South Africa) from the produce markets in Johannesburg using a normal flatbed truck. The produce, once in Zimbabwe, is sold at much lower prices, including to certain large retailers and wholesalers. It does not appear that this practice occurs along any of the other route pairs considered. To the extent that this is an illegal practice, flatbed trucks would not ordinarily be considered substitutes for trucks with refrigerated units (especially when servicing large retail clients) and the practice may have arisen as opportunistic behaviour due to some of the economic challenges faced in Zimbabwe.⁹

Subcontracting relationships are common between transporters, typically involving the subcontracting of loads to smaller transport companies. For example, Lonrho (from its Zimbabwe operations) uses its own fleet but at times also subcontracts to other transporters. The requirements it places on subcontracted transporters are as follows:

- They must comply with technical vehicle requirements and standards for the temperature-controlled unit. Each vehicle is checked by Lonrho quality controllers.
- Cleanliness is an important requirement with which customers are especially concerned, particularly when transporting fresh food products.
- They must have coverage in terms of goods in transit (GIT) insurance.
- They must have trade references.

The risk associated with subcontracting relationships is typically borne by the primary contract holder, and contracts include penalty frameworks and insurance requirements.¹⁰ The market is thus largely controlled by the large firms, although there is a competitive fringe of smaller operators in each country.

5.1 Structure and key dynamics of transport markets by country

Malawi

In Malawi the market is highly concentrated and large brokers and freight forwarders play a major role. Bollore Africa is the largest broker involved with refrigerated loads, although it does not operate trucks of its own. The company's role is to facilitate links between major clients, such as Shoprite and Chipiku (the main retail groups in Malawi), and transport companies.¹¹ Loads are subcontracted to a range of transport companies, of which there are fewer than ten firms operating in Malawi. Of these, only three or four companies are reputable in refrigerated transport, such as Siku Transport, which is the largest.

High levels of concentration in the market are linked with high entry costs and low demand, such that rates charged by those companies that are available are considered relatively high. This appears to be a feature of both the Malawi and the Zimbabwe markets, where refrigerated transport is a niche market segment serviced by few firms.

⁹ Unpublished interview conducted with Fresh Produce Marketing Association of Zimbabwe by the authors on 2 October 2015.

¹⁰ Unpublished interview conducted with OK Zimbabwe by the authors on 30 September 2015.

¹¹ Unpublished interview conducted with Bollore Africa by the authors on 13 October 2015.

South Africa

In comparison, larger players such as Imperial Group are full logistics firms that provide transport, warehousing, storage, and forwarding, amongst other services.¹² Imperial views the ability to invest in large cold storage capacity and warehousing as a key competitive advantage, particularly in securing the business of large producers such as McCain and Astral Foods. Imperial recently made investments in a distribution centre (including cold storage) in Johannesburg with a capacity of 37,000 pallet slots (Imperial Logistics 2016), which is the largest in the region and the continent by some margin.¹³ Most rivals have a capacity of not more than 10,000 pallets.¹⁴ Services are sold to clients as bundled services including transport, warehousing and storage, and integration into supply chain and distribution management. In many cases, Imperial fully co-ordinates stock management and procurement for large retailers such as Shoprite, as well as the sourcing of products from suppliers such as McCain.¹⁵ Imperial Cold Logistics in South Africa operates a fleet of approximately 140 vehicles (<10 tons) for cold chain distribution within the country alone.¹⁶ A subsidiary, Imperial Managed Logistics, conducts cross-border transport of perishables using larger trucks, including for Pick n Pay.¹⁷ In some cases, Imperial may outsource or subcontract certain loads to specialist transport firms such as HFR as well as operating its own large fleets.

The large integrated firms typically cross-subsidize across their various services such that they sometimes charge a lower rate for transport, given higher returns on storage and warehousing.¹⁸

Specialist transport firms such as HFR work in commercial relationships with the major integrated logistics firms. For example, HFR is one of the largest transporters of perishables in South Africa and the region, with approximately 185 reefer trucks. However, the firm is not integrated into storage and warehousing facilities.¹⁹ Other major transporters, some providing bundled services as well as transport separately, include Vector Logistics, Value Logistics, Unitrans, Bidvest, and Hestony.

The market in terms of transport is generally considered to be highly competitive.²⁰ The Road Freight Association (RFA) of South Africa has approximately 450 member companies including large and smaller operators, and it is estimated that there are 16,000 goods vehicle operators. South Africa had an estimated 7000–10,000 refrigerated trucks in 2011, the majority of which were small trucks and vans (Oppelt et al. 2015). Large trucks and trailers and semi-trailers constituted the balance.

¹² Unpublished interview conducted with Imperial Logistics Cold Chain by the authors on 19 February 2016.

¹³ Unpublished interview conducted with Imperial Logistics Cold Chain by the authors on 19 February 2016.

¹⁴ Unpublished interview conducted with Imperial Logistics Cold Chain by the authors on 19 February 2016.

¹⁵ Unpublished interview conducted with Imperial Logistics Cold Chain by the authors on 19 February 2016.

¹⁶ Unpublished interview conducted with Imperial Logistics Cold Chain by the authors on 19 February 2016.

¹⁷ Unpublished interview conducted with Imperial Logistics Cold Chain by the authors on 19 February 2016.

¹⁸ Unpublished interview conducted with RFA by the authors on 12 February 2016.

¹⁹ Unpublished interview conducted with HFR Logistics by the authors on 2 November 2015; unpublished interview conducted with RFA by the authors on 12 February 2016.

²⁰ Unpublished interview conducted with HFR Logistics by the authors on 2 November 2015; unpublished interview conducted with Road Freight Association (RFA) by the authors on 12 February 2016.

The operators in South Africa benefit from being able to use their trucks for both domestic and regional routes, which leads to greater efficiencies (and faster running time) on each vehicle.²¹

Zambia

The Truckers' Association of Zambia (TAZ) has only 63 member companies in all, including refrigerated transporters.²² The segment for refrigerated transport is considered to be very small and the largest volumes are brought in to the country by South African truckers.²³ For example, Shoprite, which is serviced in terms of distribution by its subsidiary Freshmark, uses South African transporters to bring products to Zambia. In turn, some of the small transport companies target loads from small- and medium-sized fruit traders which cross the border from neighbouring countries to sell in Zambia, although the loads tend to be smaller in this case.

Freight forwarding companies are typically the first contact point for customers in Zambia, especially for exports of copper and cobalt.²⁴ Importers typically make use of forwarders in the country of destination of the goods, including when importing perishable goods. There are many forwarders registered with the revenue authority in Zambia; the main companies are Bolloré, Barloworld (specializing in sugar), Impala (copper), VS Cargo (copper), and Celtic Freight, some of which are integrated into transport as well.²⁵

In most cases, reefer vehicles return empty to South Africa from Zambia, which means that the rates are high on the importing leg from South Africa.²⁶ Vehicles returning to South Africa are generally not searched at the borders as a result, although recent incidents of transporters smuggling copper concentrate back to South Africa in the vehicles has increased the frequency of use of search procedures by border officials.

In the past, imports of frozen foods (fish and meat) were sent to the Democratic Republic of Congo (DRC). However, the depletion of Zambian fish stocks and availability of Chinese imports has meant a higher level of imports of these products to Zambia. Imports of meat and fish from South Africa have also increased since around 2010/11 (see Appendix 1, Table A2). The border procedures for importing these frozen products are apparently efficient, particular when firms pre-clear goods and receive feedback from authorities before arriving at the border gates.²⁷

Zimbabwe

There are major regional players such as Lonrho, which has a base in South Africa and Zimbabwe, servicing loads within and between these countries as well as to Zambia and Mozambique primarily. Lonrho Logistics is one of the largest operators in Zimbabwe, and in the region, engaged

²¹ Unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015.

²² Unpublished interview conducted with Truckers Association of Zambia (TAZ), by the authors on 22 September 2015.

²³ Unpublished interview conducted with TAZ by the authors on 22 September 2015.

²⁴ Unpublished interview conducted with TAZ by the authors on 22 September 2015.

²⁵ Unpublished interview conducted with TAZ by the authors on 22 September 2015.

²⁶ Unpublished interview conducted with TAZ by the authors on 22 September 2015.

²⁷ Unpublished interview conducted with TAZ by the authors on 22 September 2015.

in transporting perishable products. The company is integrated into distribution, marketing, and the growing of produce. The firm operates (from its Zimbabwe office) a fleet of approximately 21 large reefer trucks and approximately seven smaller vehicles, with some registered in Zimbabwe and others in South Africa.²⁸ The Zimbabwe office customer base comprises internal loads for Lonrho Fresh, which sells domestically and in the region, although the majority of loads are on behalf of external clients.

Low demand for refrigerated transport in the countries outside of South Africa is reflected in the scale of operations of different transport companies in the focus countries. In Zimbabwe, for example, Lonrho is the largest operator, although the firm only has a fleet of fewer than 30 vehicles. TECS Haulage, also from Zimbabwe, used to operate ‘one of the largest fleets’ of reefers of around 21 vehicles.²⁹ NFB Logistics, which services mostly internal loads for group companies in dairy production, has a fleet of fewer than 20 smaller trucks (<10 tons).³⁰ The market in general is considered to be fragmented, with several small companies in operation, and few large transporters. Competition is largely with South African transporters.

Overall, there are around 12,000 trucks of various dimensions operating in the market, of which only a small subset are reefers.³¹

5.2 Quality of service and requirements of customers

Large logistics providers such as Lonrho and Imperial view the ability to offer integrated services as a key competitive advantage in the segment, as noted above. Lonrho, for example, is integrated into warehousing, cold room storage, clearing, and air transportation.³² Effective IT systems, distribution of agents in various countries, and redundancy or back-up systems for when vehicles break down are important differentiators between firms. Certain smaller operators are not able to meet some of these requirements. However, given challenges in the Zimbabwean economy in particular, users of transport have tended to award some contracts to smaller operators due to the significant price advantage over larger transporters. Smaller operators can charge rates which are lower by 10–15 per cent in some cases, given that they have lower overheads and tend to spend less on maintenance of vehicles, for example.³³ Small transport companies have also benefited in the past five years from the availability of used vehicles from Europe and the US, which has made it possible to enter the market and compete with established transporters (other than in South Africa, where these vehicles are not permitted).

On the other hand, large transporters establish long-term relationships with clients. Mar Group has a large contract with Shoprite to service a large proportion of its business in Southern Africa.³⁴ Some routes are less profitable than others but the value for the transporter is in securing the total volumes of the client. OK Zimbabwe, which is a large grocery retailer importing fruit from South

²⁸ Unpublished interview conducted with Lonrho Zimbabwe by the authors on 30 September 2015.

²⁹ Unpublished interview conducted with TECS Haulage by the authors on 30 September 2015.

³⁰ Unpublished interview conducted with NFB Logistics by the authors on 2 October 2015.

³¹ Unpublished interview conducted with Transport Operators’ Association of Zimbabwe (TOAZ) by the authors on 29 September 2015.

³² Unpublished interview conducted with Lonrho Zimbabwe by the authors on 30 September 2015.

³³ Unpublished interview conducted with Lonrho Zimbabwe by the authors on 30 September 2015.

³⁴ Unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015.

Africa, operates on the basis of an annual contract with transporters. In the past it has made use of Value Logistics and Vital Distribution Systems, both from South Africa, for transport, along with brokers or freight forwarding companies (such as Manica, UTI, and Freight World).³⁵ In the contract, certain service-level standards are fixed, as well as the rate which will apply in the period. The contracts allow for variability if there are significant changes in fuel costs and other variable cost parameters.³⁶ If there is further subcontracting done by the transport companies, they are required to ensure adequate quality of service by subcontracted transporters as per the contract.

Similarly in South Africa, contracts with clients for transport tend to be for a shorter duration, at most two years, and are reviewed regularly on the basis of performance, back-up systems available, and the price offered by the transporter.³⁷ Contracts involving bundled services and full integration of supply chain management may be longer, up to five years.³⁸ Large clients will pay more for a more reliable and comprehensive service, and transporters sell themselves on the basis of reputation, low accident rates, financial position and management of the company, track record, and, in the South African context, aspects such Broad-Based Black Economic Empowerment credentials.³⁹ A lack of a strong track record makes it difficult for small- and medium-sized companies to service the large retail customers.⁴⁰

In this context, grocery retailers were asked to rank the most important aspects of service which they consider when contracting with a transporter. These (five) factors draw on the approach followed in Zamparini et al. (2011), wherein aspects of freight quality in Tanzania were considered, as discussed above. In that study, shippers weighed transit time, loss and damage, and frequency as being most important. In the current research, retailers emphasized the following aspects (ranked from most to least important):

1. Reliability
2. Timeliness (transit times)
3. Flexibility
4. Frequency
5. Loss and damage

OK Zimbabwe indicated that the company was less concerned about loss and damage and frequency because the contracts agreed with transporters incorporated penalties for this and the terms were generally adhered to.⁴¹ On the other hand, on-time and reliable delivery of loads was viewed as critical, which ties in with the importance for retailers of competing on the basis of having a variety and adequate stock of fresh products. Similarly, Woolworths ranked reliability and

³⁵ Unpublished interview conducted with OK Zimbabwe by the authors on 30 September 2015.

³⁶ Unpublished interview conducted with OK Zimbabwe by the authors on 30 September 2015.

³⁷ Unpublished interview conducted with RFA by the authors on 12 February 2016.

³⁸ Unpublished interview conducted with Imperial Logistics Cold Chain by the authors on 19 February 2016.

³⁹ Unpublished interview conducted with HFR Logistics by the authors on 2 November 2015; unpublished interview conducted with RFA by the authors on 12 February 2016; unpublished interview conducted with Transtech Logistics by the authors on 23 September 2015.

⁴⁰ Unpublished interview conducted with RFA by the authors on 12 February 2016.

⁴¹ Unpublished interview conducted with OK Zimbabwe by the authors on 30 September 2015.

timeliness as most important for both FMCG and perishable goods⁴². However, loss and damage was also ranked as being critical, along with frequency for perishable products.

The requirements of retail groups are complex and in most cases extend beyond the capabilities of transport or forwarding companies. For example, Manica, which is one of the largest multinational forwarding agents in the region, stated that the company had chosen not to compete for forwarding of FMCG goods and perishables partly because the requirements in terms of staff training, expertise, and operational systems in order to fully integrate with large retailers are extensive.⁴³ Similarly, certain transporters choose not to provide refrigerated transport services or have exited this market because of the complexities and requirements associated with this, as discussed above.⁴⁴

6 Transport rates and costs

6.1 Transport rates

Transport rates are affected by a range of factors, including distance travelled, route, number of border crossings and expected delays, cost drivers such as fuel, and the availability of a return load. Information has been collated from various interviews regarding the rates charged by transporters for different routes in 2015 (Table 3). In each case, an average rate for the specific route is stated based on the different estimates obtained from truckers and users of transport such as supermarkets. A focus is placed on those legs originating in Johannesburg to the other cities (Harare, Lilongwe, and Lusaka). The rates charged for ordinary flatbed trucks of similar dimensions, as well as for other route pairs involving Cape Town and Durban, are also included as comparators. We begin by setting out some of the general observations about rates for refrigerated transport in the region:

- In general, refrigerated truck rates are higher by some margin than those for ordinary trucks used for transporting commodities (e.g. copper), which indicates the additional energy required to power fridge units, the lower supply of reefers generally, and the higher investment and/or fixed costs involved in refrigerated trucking, as discussed further below.
- Rates tend to be even higher in more concentrated domestic markets such as Malawi and Zimbabwe.
- Rates are also affected by seasonality. For example, rates will be higher in peak season when there is a large harvest of citrus fruits from the Western Cape in South Africa requiring trucks for distribution in South Africa and across borders.⁴⁵
- Rates tend to be lower or discounted if clients are transporting a large number of loads or have a contract to transport products for a lengthy period with high frequency of loads.⁴⁶

⁴² Written submission by Woolworths Supply Chain, received 13 August 2015.

⁴³ Unpublished interview conducted with Manica Zambia by the authors on 25 September 2015.

⁴⁴ Unpublished interview conducted with Transtech Logistics by the authors on 23 September 2015.

⁴⁵ Unpublished interview conducted with HFR Logistics by the authors on 2 November 2015.

⁴⁶ Unpublished interview conducted with HFR Logistics by the authors on 2 November 2015; unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015.

- Cross-border transport rates are generally higher, given the additional ‘hassle’ and ‘risk’ carried by the transporter, including the higher costs of insurance, difficulties in finding repair centres in neighbouring countries, goods in transit (GIT), and the costs of agents.
- Smaller transport companies with lower overheads may charge rates that are around 10–15 per cent lower than those reflected as average rates in the market below.⁴⁷

Rates charged for the return leg to Johannesburg from the different urban centres in the region are on average 70 per cent (or less in some cases) of the outgoing rate. On some routes, such as Johannesburg to Harare, the return leg to Johannesburg is charged at less than half the price of the trip in the other direction: on average US\$0.05 per ton per kilometre compared to \$0.13 in the other direction (Table 3). This is reflective of the discount available for the return leg journey (or the premium charged on the outbound leg).

Our view is that the low rate charged on the return leg on any route is essentially reflective of the level to which rates could potentially be reduced on both legs. This rate accounts for almost all of the same cost items and border crossings involved in returning the truck if the truck has a load on the return leg.⁴⁸ Furthermore, transporters charge less on the outgoing leg from Johannesburg if they are already guaranteed a return load, at around 70 per cent of the outgoing rate. In addition, transporters of refrigerated goods in Southern Africa can generally complete more trips per month because the trucks are empty on the return leg⁴⁹, which also means transporters can distribute their costs over more loads in a month, allowing them to reduce rates charged overall.

Therefore, an opportunity exists in the region to decrease rates on each leg by instituting measures which guarantee return loads for transporters, perhaps through co-ordinating growers of certain vegetables or other perishables in the other countries to load goods for sale in South Africa. Such a mechanism would also mean lower transport rates for exporting producers in South Africa, including the large retail groups. We return to this issue in the discussion below.

It is also possible to compare rates in the market with an appropriate competitive benchmark. The rate charged between Johannesburg and Cape Town (in South Africa) is appropriate as a marker for what efficient, competitive rates could be in the market if border crossings were efficient and not a constraint at all, and absent the additional risks associated with cross-border transit in different countries. Effectively, rates for cross-border refrigerated transport should be similar to those for inland transport by reefer truck in South Africa, or even lower and closer to developed-country rates given lower overheads and low vehicle investment costs outside of South Africa (through the use of second-hand vehicles), as well as low labour costs and reduced fuel costs in 2015 in the other countries in the region.

The rate between Cape Town and Johannesburg was *US\$0.06 per ton per kilometre*, or *\$1.68 per kilometre*, in 2015, which is our (conservative) efficient transport benchmark for all routes.⁵⁰ This rate is close to that for the return leg from Harare to Johannesburg noted above, and corresponds with efficient rates in OECD countries of around \$0.04 per ton per kilometre (Rashid and Minot

⁴⁷ Unpublished interview conducted with Lonrho Zimbabwe by the authors on 30 September 2015.

⁴⁸ If the truck returns empty the vehicle will typically not be stopped at the borders, and fuel costs are lower without a load, such that the cost base is lower than with a load.

⁴⁹ Unpublished interview conducted with Transtech Logistics by the authors on 23 September 2015.

⁵⁰ For refrigerated transport it is more relevant to consider rates per kilometre and total rate charged for the trip, given that customers pay for the use of the entire container or unit, and weight is not necessarily a constraint with perishable goods to the extent that it is with, say, copper loads.

2010). We compare this benchmark to the rates on different routes in 2015, to understand whether specific factors related to each route contribute to higher rates, and whether there are factors which cut across countries as well.

Table 3: Average refrigerated and non-refrigerated transport rates per leg, 2015

From	To	Distance (km)	Total rate (US\$)	\$/ton/km	\$/km	Non-reefer (\$)
Johannesburg	Harare	1121	4498	0.13	4.01	2500
Johannesburg	Lilongwe	1863	5040	0.09	2.71	3950
Johannesburg	Lusaka	1576	4548	0.10	2.89	3660
Johannesburg	Cape Town	1398	2352	0.06	1.68	-
Harare	Johannesburg	1121	1750	0.05	1.56	-
Cape Town	Harare	2523	7200	0.10	2.85	5000
Durban	Harare	1680	4705	0.09	2.80	-

Note: Rates are for a 40-ft container or 30-ton flatbed-equivalent reefer truck.

Source: Various interviews.

The *Johannesburg–Harare* route has a rate per kilometre which is more than double the efficient benchmark rate, and higher than rates for both Johannesburg to Lilongwe and Johannesburg to Lusaka. Interestingly, the Johannesburg–Lilongwe route has a lower charge than Johannesburg to Harare, although the former is a longer distance and involves three border crossings from South Africa via Zimbabwe and Mozambique (compared to one between South Africa and Zimbabwe). The market in Zimbabwe is highly concentrated, and there is no competition on cross-border routes from Zimbabwean transporters other than large multinational operators such as Lonrho, given that many smaller operators have exited the market. Given a significant decline in the last decade in the production capacity of farms in Zimbabwe, imports from South Africa are an important source of goods (see Appendix 1, Table A3). However, the transportation of loads is done largely by South African transporters that charge high rates, as discussed, even though the distance between Harare and Johannesburg is shorter compared to the other routes.

Although the market in Malawi is also concentrated, there are more local transporters involved in refrigerated transport, and there are also competitors from Mozambique that bring in products, which means it has not been possible to raise rates on Malawi routes even as vehicle maintenance, tax, and finance costs have increased.⁵¹ Despite this, rates for both *Johannesburg–Lilongwe* and *Johannesburg–Lusaka* are high above the efficient benchmark. Each of these markets is relatively concentrated and competition on cross-border routes is largely between a few well-established local operators and large South African transporters. The high rates on both routes are also reflective of border delays and multiple border crossings. The Chirundu border post has improved considerably over the past five years, although there are still areas for improvement, as discussed below. The Beitbridge border gate is known to have the most significant delays in the region, with trucks queueing in some cases for up to three or four days. Travelling to Malawi from Johannesburg includes passage through Beitbridge and two other border posts.

The high presence of South African transporters moving goods for the large retailers also has an effect on competition on routes from South Africa to Malawi, Zambia, and Zimbabwe, which is a cross-cutting issue. The retail groups enter into contracts of one or two years with transporters

⁵¹ Unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015.

and/or forwarders (which may in turn subcontract loads). In the case of Shoprite, an internal logistics subsidiary, Freshmark, is used primarily. The effect of contracts is that even though there may be competing transporters on the routes, prices and access to loads are ‘fixed’ in the terms of the contracts, with only some adjustment for major changes in the price of key cost drivers such as fuel.⁵² Supermarket groups also prefer to use large forwarders and transporters, meaning that small- to medium-sized operators with capacity to transport loads for them (potentially at lower rates) can only do so via subcontracting, if at all. The contracts therefore create exclusivity over the largest share of loads for major refrigerated transporters. The effect of this is that rates tend to be higher due to the combination of this exclusivity and the preference of large retail groups for using transporters that can provide them with a reliable, one-stop, comprehensive offering.

In this context, smaller transport groups compete for subcontracted loads or service small retail outlets. For example, some of the smaller retail groups in Malawi, such as Chipiku and Sana, also import perishable products using South African transporters, typically using smaller transport operators. These clients import goods less regularly, and at relatively limited volumes, which decreases the viability of small- and medium-sized refrigerated transport businesses. Conversely, longer-term contracts enhance the viability of the major transporters. For Shoprite, transporters may secure a single contract for refrigerated transport to different areas in the region. As such, transport companies such as Mar Group from South Africa may run some routes at a loss or close to break-even in order to keep the full contract volumes with the retailer for the region as a whole.⁵³ The route from Johannesburg to Lilongwe is apparently a good example of this.⁵⁴ Effectively, lower rates obtained for travelling to Malawi can be balanced with profits made on the Harare route, for example. Transporters prefer to target contracts which have regular loads throughout the year rather than seasonal or short-term opportunities in order to achieve optimal usage of the vehicle.⁵⁵ Margins on the former may be lower; however, the consistent volumes throughout the year compensate for this. The nature of contracts is thus skewed in favour of large transport companies for refrigerated transport in particular.

6.2 Operational costs and costs of entry

The operational costs of running the truck and trailer are not vastly different from those involved in running normal flatbed trucks of similar dimensions, other than for the additional refrigeration unit.⁵⁶ Importantly, because the unit can be switched off when not required, these fuel costs only accumulate when there is a load and can be effectively managed by the transporter. Based on the differences between ordinary trucking rates for commodities and those for reefers (Table 3) it is clear that there is a large premium charged for refrigerated transportation. Net margins are as high as 40 per cent in some cases.⁵⁷ This reflects both a lack of return loads and limited competition between South African transporters and those in each of the other countries.

⁵² Unpublished interview conducted with OK Zimbabwe by the authors on 30 September 2015; unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015.

⁵³ Unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015.

⁵⁴ Unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015.

⁵⁵ Unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015.

⁵⁶ Unpublished interview conducted with Kleiner Apex by the authors on 25 September 2015.

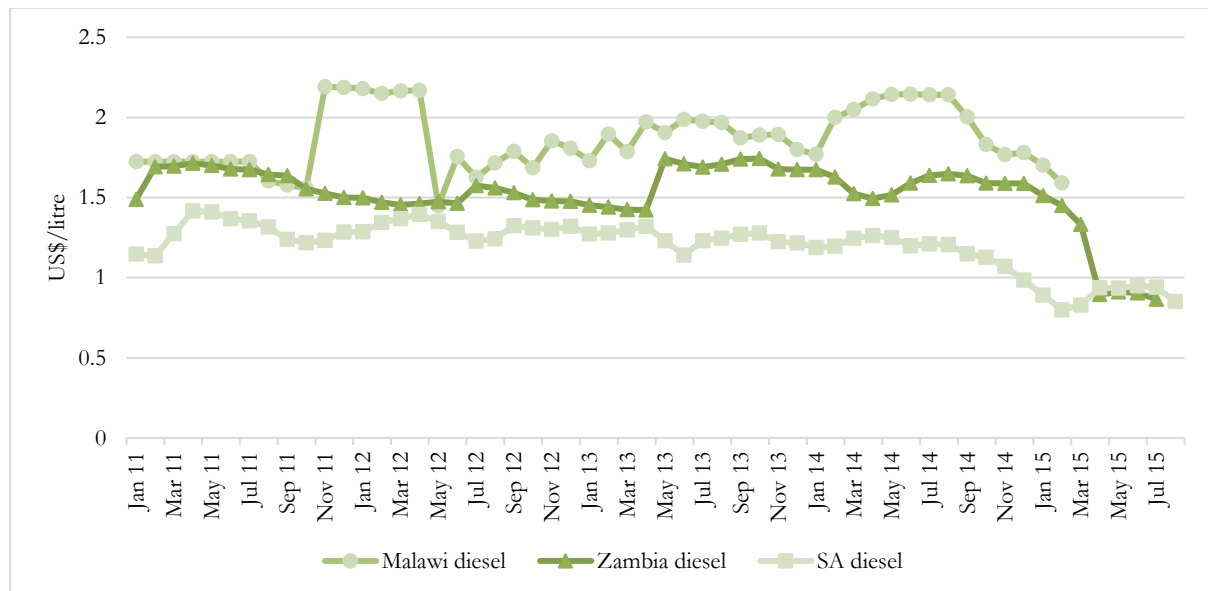
⁵⁷ Unpublished interview conducted with Kleiner Apex by the authors on 25 September 2015.

In the region, transport of refrigerated products is a small subsector partly because of the costs involved in purchasing the cold unit. The towing vehicle costs R1.3–1.5 million (US\$0.1–0.12 million) in South Africa, and the trailer including the chassis and fridge unit costs an additional R1.0 million (\$0.08 million) if it is built in South Africa.⁵⁸ The total cost of the vehicle and trailer in South Africa is thus around R2.5 million (approximately \$0.2 million).

Towing vehicles tend to be replaced every four to five years, whereas trailers can be replaced over seven to eight years.⁵⁹ Reefer units are required to be replaced more frequently than normal flatbed trailers and as such the period required to achieve full return on capital invested is generally shorter.⁶⁰ In addition, maintenance costs are higher for reefers and the condition of the unit is an important selling point for the truckers.

High entry costs are more prohibitive in the case of refrigerated transport than in the transportation of commodities. This is especially the case in countries outside South Africa in the region, where the demand available does not justify the entry and maintenance costs incurred, even when second-hand vehicles are purchased. Certain operational costs, such as for fuel, are also higher in Malawi and Zambia, for example, when compared with South Africa (Figure 11).

Figure 1: Domestic diesel prices in Malawi, South Africa, and Zambia, 2011–15



Note: Data for Zimbabwe unavailable at the time of writing.

Source: MERA (2016); Energy Regulation Board (2017); Department of Energy (n.d.); authors' own calculations.

The comparison of fuel rates for different routes is confounded by differences in the road infrastructure quality, gradient, distance, speed, load carried, and characteristics of the vehicle used, amongst other factors. One example provided is that the Walvis Bay route has relatively good road infrastructure and efficient border processes when compared to those along the trunk routes of

⁵⁸ Unpublished interview conducted with HFR Logistics by the authors on 2 November 2015.

⁵⁹ Unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015; unpublished interview conducted with HFR Logistics by the authors on 2 November 2015.

⁶⁰ Unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015.

the North–South corridor.⁶¹ The share of fuel in the unit variable costs is thus generally lower on this route than on the Johannesburg–Lilongwe route.

As noted above, the main operating costs for a refrigerated truck are not significantly different from those for an ordinary truck (Vilakazi and Paelo 2017). It is therefore useful to compare a ‘rule of thumb’ cost benchmark for operating in the region with the rates charged for refrigerated transport. The Transport Operators’ Association of Zimbabwe (TOAZ) indicated a general benchmark for transport costs in the region of US\$1.89 per kilometre.⁶² On some routes where there is significant distance and risk (such as to DRC) an ‘efficient’ cost-base is around \$2.00 per kilometre.⁶³

We consider the higher estimate as a conservative marker for efficient costs. The prices charged (per kilometre) on each route are well above costs, and double in some cases, which is consistent with information from interviews suggesting that margins tend to be high for refrigerated transport.⁶⁴ It is only on return legs to Johannesburg that the prices are constrained by the fact that South African transporters, for example, can charge a rate which only needs to cover their costs.⁶⁵ However, given that the estimate provided did not relate specifically to refrigerated transport, some caution should be exercised in interpreting these margins. It is perhaps more significant that the rate per kilometre between Johannesburg and Cape Town is approximately US\$1.68 per kilometre, which, as discussed, can be considered a strong benchmark for efficient transport. Only the rate for the return leg from Harare to Johannesburg is lower than this in Table 3.

6.3 Delays and bottlenecks for refrigerated transport

Certain bottlenecks in transit between countries can affect the cost-base and rates charged by transporters. Moreover, due to the nature of perishable goods it is extremely important that the transporter gets through the border within a specific time (based on their contract with the client or agent), although this is not always within the control of the transporter. Depending on the cause of the delay, demurrage may be charged and the costs of the delay may be borne by the client or their agent. A delay of one day can cost a transport company US\$400 per day for a truck that is stationary (see Vilakazi and Paelo 2017).⁶⁶ This applies to ordinary trucks with flatbed trailers and is expected to be higher for refrigerated trucks carrying a load, given the need to run the fridge unit throughout the period of the delay. Key bottlenecks and causes of delays identified include:

- Clearance systems between countries and across the SADC region are not harmonized. For example, although Zimbabwe and Zambia both use the Automated System for Customs Data (ASYCUDA), Zambia apparently uses an older system which does not integrate with the one in Zimbabwe. ASYCUDA is an internet-based system through which importers and clearing agents may submit their clearance documents. South Africa applies a different system, Easyclear, which also does not integrate with those in the other countries. The systems could be integrated to interoperate, which is an area for possible

⁶¹ Unpublished interview conducted with Kleiner Apex by the authors on 25 September 2015.

⁶² Unpublished interview conducted with TOAZ by the authors on 29 September 2015.

⁶³ Unpublished interview conducted with Transtech Logistics by the authors on 23 September 2015.

⁶⁴ Unpublished interview conducted with Kleiner Apex by the authors on 25 September 2015.

⁶⁵ Unpublished interview conducted with Transtech Logistics Malawi by the authors on 16 October 2015.

⁶⁶ Unpublished interview conducted with J & J Transport Zambia by the authors on 25 September 2015.

intervention.⁶⁷ In the Southern African Customs Union (SACU), for example, border management and information systems apparently work well together and are standardized; bottlenecks arise when leaving SACU countries due to electronic systems and the coding of products for tax and duty purposes differing from those of other countries.⁶⁸

- Zambia does not give preference to transporters of time-sensitive goods, whereas at Beitbridge it is possible for these transporters to pass through and bypass the main queues.⁶⁹ This results in a loss of shelf-life for perishable goods due to longer waiting times during transit. Pre-clearance of goods therefore does not always translate into an advantage for the transporter, as it does between Zimbabwe and South Africa, for example. Where it has been used effectively, there have been benefits to transporters and customers.⁷⁰
- Border posts, such as Chirundu between Zambia and Zimbabwe, do not operate on a 24-hour basis (only up to 10 pm), which has implications for parking fees and additional queues at the gate. Transporters carrying perishable goods are required to wait overnight as well, resulting in additional fuel costs for refrigeration.⁷¹
- Tariff structures and the coding of goods may differ between countries, resulting in delays in terms of clearing in each country.

Although there are several areas for further improvement, there have been significant improvements over the past five years and congestion at borders has reduced.⁷² The introduction and effective implementation of pre-clearance of goods has been an important contributor, particularly because sealed, pre-cleared loads are able to proceed through the border with minimal delays from inspection and queues of transporters of commodities and closed containers.⁷³ Freight companies with good IT systems and forwarding capabilities are able to leverage the ability to pre-clear to their advantage, and can factor any delays into the planning of their routes and the commitments made to customers.

Ongoing improvements in the use of the one-stop border post (OSBP) at Chirundu have made it easier to transport goods between the countries (and on routes passing through Zambia on to DRC) mainly because the transporter or forwarder only clears the goods once.⁷⁴ On the other hand, Beitbridge remains a constraint partly because goods are effectively required to be cleared twice at the border post on the same leg (on the Zimbabwean and the South African sides).

Compliance with phytosanitary regulation does not generally appear to be a significant concern, although there have been bottlenecks in the transit of certain fruits. Before a product can be exported, a pest risk assessment must be undertaken and clearance must be applied for in advance by the exporter or importer. If the produce comes from a region with high risk of a particular pest, the product might be banned or the importing country could withhold an import permit. The

⁶⁷ Unpublished interview conducted with RFA by the authors on 12 February 2016.

⁶⁸ Unpublished interview conducted with TAZ by the authors on 22 September 2015.

⁶⁹ Unpublished interview conducted with Lonrho Zimbabwe by the authors on 30 September 2015.

⁷⁰ Unpublished interview conducted with TAZ by the authors on 22 September 2015.

⁷¹ Unpublished interview conducted with TAZ by the authors on 22 September 2015.

⁷² Unpublished interview conducted with Cold Feet by the authors on 13 November 2015.

⁷³ Unpublished interview conducted with Lonrho Zimbabwe by the authors on 30 September 2015; unpublished interview conducted with OK Zimbabwe by the authors on 30 September 2015; unpublished interview conducted with HFR Logistics by the authors on 2 November 2015.

⁷⁴ Unpublished interview conducted with OK Zimbabwe by the authors on 30 September 2015

producer is then required to show that it has undertaken adequate mitigating measures, such as spraying and monitoring, to eliminate any risk. In South Africa for instance, the import of grapes, melons, and sweet and chili peppers from Zambia has been banned or restricted at times.⁷⁵ Some farmers and associations believe that this a form of trade restriction to protect South African markets, as adequate measures have been applied by the producers to ensure that their produce meets the phytosanitary requirements. Some farmers interviewed have withdrawn from exporting to South Africa because of this and due to the ‘hassle’ of transporting time- and temperature-sensitive goods across borders in the region, an important issue to address at both the bilateral and the regional economic community levels.

7 Discussion: cross-cutting issues and competitive dynamics in refrigerated transport

This assessment highlights a number of critical drivers of transport prices for perishable goods. The foremost of these is the unavailability of return loads back to Johannesburg from urban areas in the region. Rates for the outgoing leg have been shown to be more than double in some cases when there are no return loads, and are in general around 50 per cent more. There is a substantial opportunity which exists for produce from the different urban centres (including produce delivered by farmers and producers to storage and distribution centres in urban areas) to be transported at cheaper rates on the return leg to Johannesburg. At different times, producers have leveraged this to export fresh produce and flowers to South Africa.⁷⁶ However, this is not organized or co-ordinated between producers, authorities, or suppliers of transport services, or at a country level; this is an area for intervention.

The integration of markets in the region depends not only on the removal of tariff and non-tariff barriers to trade, but on the emergence of efficient, competitive transport as well. It is clear that transport rates could be reduced through reducing border constraints. The imbalance in trade flows cannot be corrected in the short term as this is linked to productive capacity, export competitiveness, and demand in the different countries. However, we consider that regional industrial development strategies could be more comprehensive in targeting not only the creation of hubs of industrial development but also partnerships in the co-ordination of transportation. Specifically, trade-offs negotiated between countries should encompass agreements on the mechanisms for movement of goods. The level of transport rates can be taken for granted when, in fact, it ties in with the competitiveness in terms of the price of the goods that will be produced and ideally traded. A regional market for production of perishables (presumably preferred by policy makers to imports from overseas sources) could benefit significantly from agreements between countries on a mechanism for the ‘sharing’ of transporters.

A practical intervention could be the engagement of transporters, retailers, industry associations of potential exporters in each country, and relevant government agencies to determine the parameters for an online system for ‘marketing’ of return loads. This could comprise a platform where small exporters (which may not currently export goods, but may want to do so) can be connected with transporters that have capacity for loads. Informal systems and websites of this nature exist; however, a centralized platform cutting across countries in the region would ensure mutual benefits. Such a platform could serve to allocate return loads to a preferred list of registered and accredited transporters, and connect producers with transporters which are prepared to carry

⁷⁵ Unpublished interview conducted with Enviro Flor by the authors on 21 September 2015.

⁷⁶ Unpublished interview conducted with Zambia Export Growers’ Association (ZEGA) by the authors on 21 September 2015; unpublished interview conducted with Enviro Flor by the authors on 21 September 2015.

those exported goods as return load at reduced rates. Preferential rates could be determined based on the running costs of returning the vehicle to South Africa plus a small margin, given that the trucks would have been running without loads in any case.

The specific parameters of such a system would require partnership with the private sector to design and implement. Models currently exist in other sectors for similar platforms. For example, the Uber taxi-hailing system relies on the same principles—connecting passengers directly with private transporters using an internet-based mobile application. Private vehicles and drivers are vetted and consistently monitored in terms of performance, and rates adjust for prevailing market conditions.

The practicalities of such an intervention would require resources and close co-operation between private and public actors to implement. However, it does provide an example of the form of innovative intervention which would address information asymmetry between transporters and users in the market, and which could result in mutually beneficial outcomes between countries. For example, South African exporters could benefit from lower outgoing rates, while current and potentially new exporters from the other countries would benefit from preferential, co-ordinated access to transport for products exported to South Africa and other partner countries. The COMESA Electronic Market Exchange System (CEMES) is intended to be a virtual marketplace for buyers and sellers of goods across COMESA (the Common Market for Eastern and Southern Africa) member states. This innovation may go some way towards addressing some of the concerns raised, and the system purportedly fulfils a range of functions, including 'Business Directory for Africa, Orders, Transport, Tracking, Customer profiling, Stock management, Security Module and E-Payments platform' (CBC 2016). It is not clear from the website what the specific components of each function are, and how it might operate in terms of transport services.

Other important concerns in the sector relate to delays and lengthy border procedures, as noted above, costing at least US\$400 per day that the truck is stationary. This finding is consistent with the literature reviewed, which emphasizes increased efficiency in border procedures as being more important in some cases than investment in infrastructure in Southern Africa. It is possible to resolve some of these constraints through practical, win-win interventions that alleviate the extent of border delays, if not eliminate them altogether. For example, information from interviews suggests that clearance systems between countries could be adapted to be interoperable. Of course, it is important to consider here that delays at the border increase the opportunity for rent-seeking, which may be of direct financial benefit to those officials and agents operating at the border. However, the indirect cost of these practices is higher transport rates and thus higher prices for key consumer goods and commodities in general, which is highly detrimental to trade and economic development.

More extensive interventions such as the introduction of OSBPs require adequate funding and co-operation between countries. On the other hand, it may be more practical in the shorter term to ensure that the treatment of perishable goods transporters at different border posts is standardized. In this regard, authorities in Zambia, for example, could assess the potential for creating preferential queuing at the border for transporters carrying perishables, which, as we understand it, does not currently exist.

Underlying the challenges in the implementation of efficient and harmonized transport systems in the region appears to be the concern that, in a more open market, South African transporters may crowd out transporters from other countries. In addition, more efficient transit could mean greater access to neighbouring countries for South African exporters and retailers, thus diminishing the incentive for the retailers to source locally in the different countries and undermining local producers. This is a complex set of challenges tied in closely with political economy considerations

within and between countries. There are clearly important trade-offs that need to be assessed, which should include the quantification of potential gains for each country from new approaches to integration such as the transport co-ordination mechanism described above. For example, the savings for supermarket groups from reduced transport costs could, in agreement with the retailers, be used to contribute to local supplier development for certain perishable goods in the different countries in which they operate. Ongoing interaction with the retailers themselves, perhaps at the level of regional economic communities, could also be used to learn from the best practices in terms of efficient movement of goods within the region. This is different from regulation which seeks to impose interventions in the market rather than foster partnerships for resolving key bottlenecks. Critical to the success of such an approach is the consideration of any trade-offs between countries as part of broader regional industrial development strategies, rather than narrow country policies that do not consider the region as a larger potential market.

In terms of the main research questions outlined at the outset, there are some important findings:

- The market for refrigerated transportation is concentrated in Malawi, Zambia, and Zimbabwe. A few large firms compete for loads in these countries and across borders.
- South African transporters operate in a more competitive market domestically, including very large integrated logistics firms as well as specialist refrigerated transporters. These large firms are generally contracted by the major supermarket groups and, as such, transport the majority of perishables goods moving across borders in the region.
- The major retail groups have complex requirements in terms of the technology and supply chain management systems needed to ensure reliable, timely, and flexible service. These aspects were ranked as the most important requirements by retailers and the transporters servicing them. Large exporters from South Africa are prepared to pay a premium for comprehensive services.
- Rates paid in 2015 for refrigerated transport were higher than those for transporting commodities, reflecting the premium charged for complying with these requirements, high levels of concentration in the market, and the costs of delays and lack of return loads.
- Rates from Johannesburg to Harare, Lilongwe, and Lusaka are higher than the benchmark efficient transport rate considered of US\$1.68 per kilometre, which could be attained if border procedures were made to be more efficient, delays were reduced, and transporters had greater access to return loads.

Lastly, we note that there is a lack of comparable and consistent data on prices and the other costs involved in transporting goods across borders. This is an important area for intervention given the emphasis on integrating markets in Southern Africa. Data on prices and key costs should be collected and made available at the regional economic community and country levels to aid authorities and the research community in assessing changes over time in the market and the impact of particular interventions, in turn informing policy going forward. One example of a practical approach is to include a line for 'transport charge for consignment' in the existing import/export documentation filed with authorities at the border, which importers and exporters could fill in and submit as part of regular procedures.

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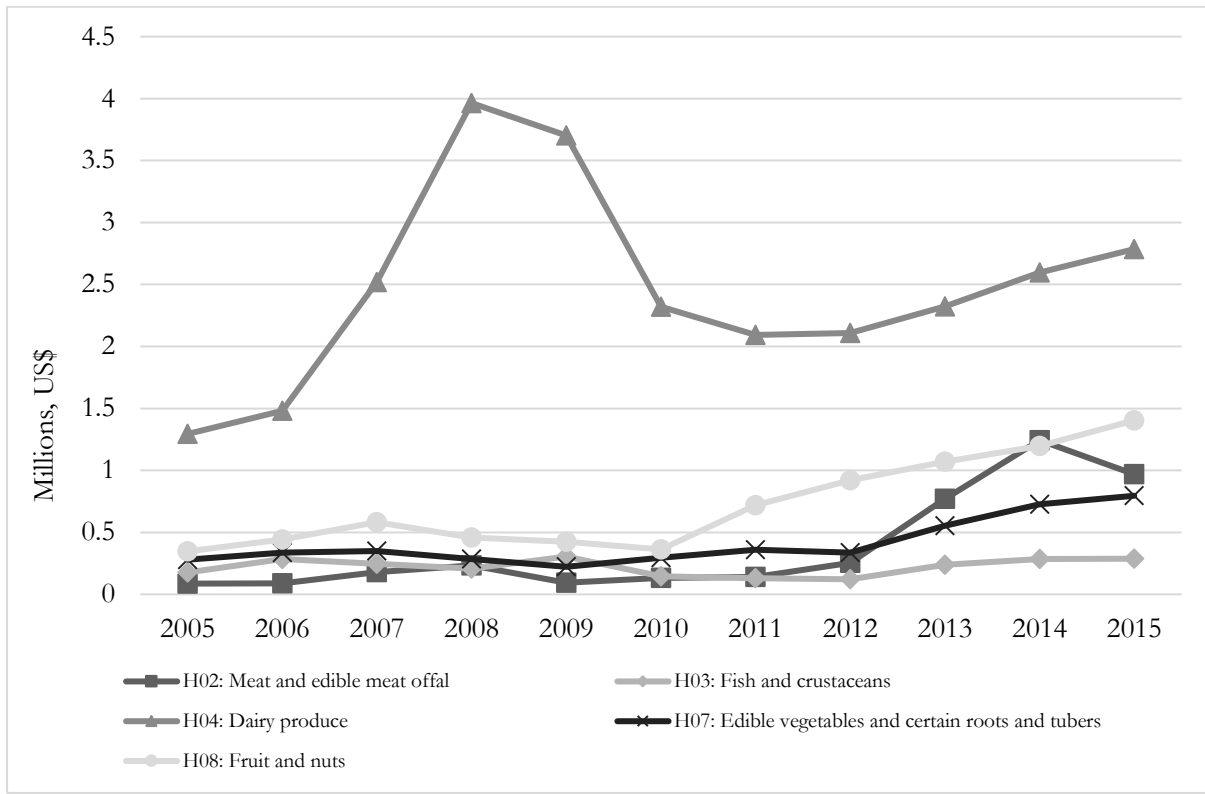
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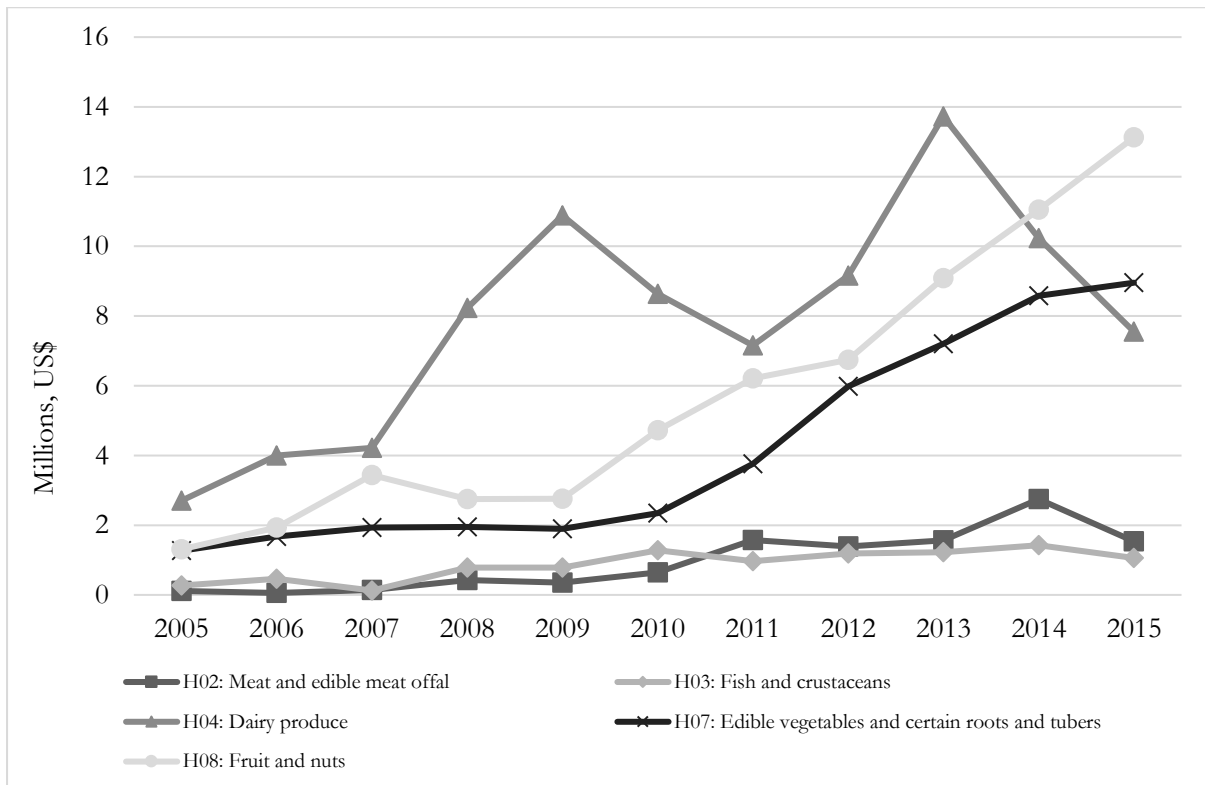
Appendix 1: South African exports of various perishable goods

Figure A1: South Africa exports of various perishable goods to Malawi



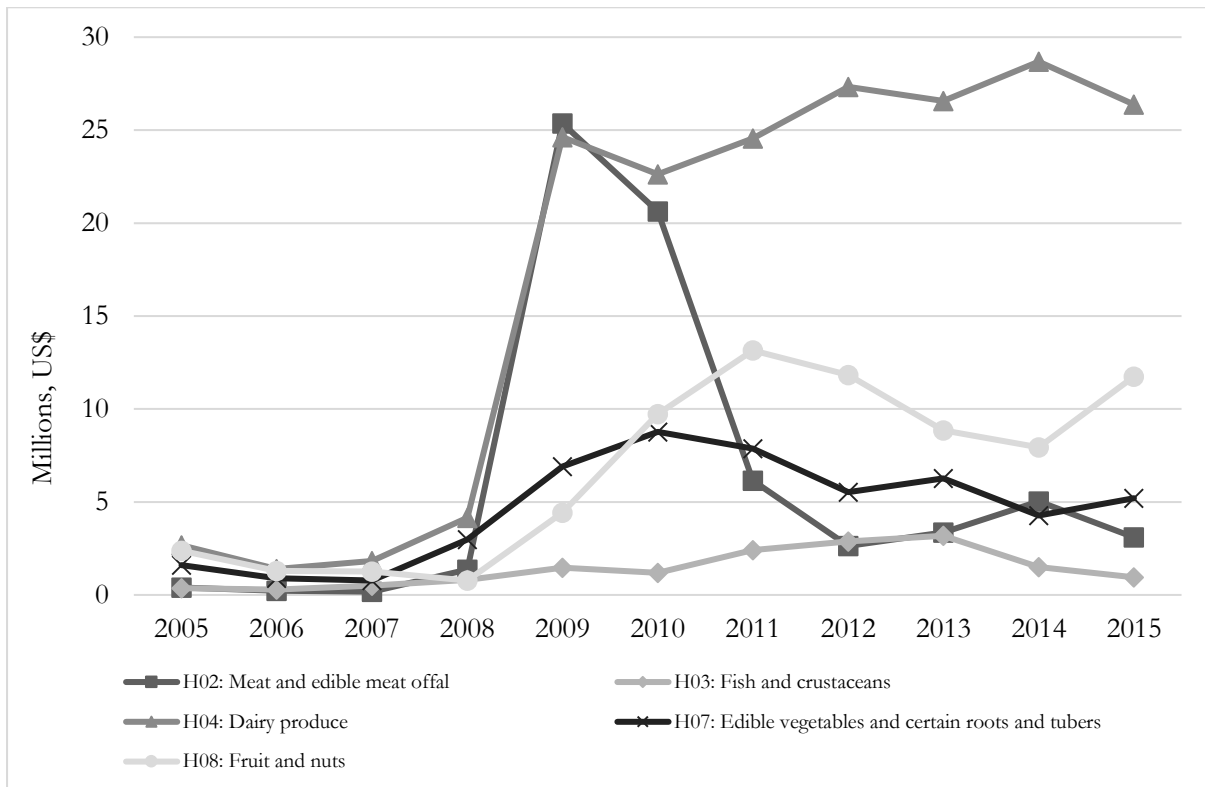
Source: Quantec (n.d.).

Table A2: South Africa exports of various perishable goods to Zambia



Source: Quantec (n.d.).

Table A3: South Africa exports of various perishable goods to Zimbabwe



Source: Quantec (n.d.).

Appendix 2: List of interviewees

1. Truckers' Association of Zambia (TAZ)
2. Transtech Logistics Zambia
3. Transtech Logistics Malawi
4. Kleiner Apex Ltd
5. J & J Transport Zambia Ltd
6. Zambia Export Growers' Association (ZEGA)
7. Enviro Flor
8. NutriFeed
9. Novatek
10. Manica
11. Transport Operators' Association of Zimbabwe
12. Verbena Logistics
13. Unifreight Africa Ltd
14. Lonrho Logistics
15. TECS Haulage
16. NFB Logistics
17. Fresh Produce Marketing Association of Zimbabwe
18. OK Zimbabwe Ltd
19. Freight World
20. Clearing and Forwarding Agents' Association of Malawi (also Combine Cargo)
21. AS Investments
22. Chipiku Plus
23. Sana Cash n Carry
24. City Supermarket
25. Shoprite
26. Bollore Africa
27. Cross-Border Road Transport Agency of South Africa
28. HFR Logistics
29. Cold Feet
30. Imperial Cold Logistics
31. Road Freight Association (RFA) (South Africa)
32. Transporters' Association of Malawi