IMPROVING COMPETITIVENESS OF COMPANIES IN SOUTH AFRICA THROUGH LOGISTICS AND SUPPLY CHAIN MANAGEMENT

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ABSTRACT

This paper provides a comparative analysis of logistics performance globally with that of South Africa and refers specifically to the cost of logistics. Transport costs are by far the single most important contributor but time in transit is also an important performance indicator, along with efficient warehousing, smooth customs clearance, appropriate infrastructure, track and trace functionality, to name but a few. The findings of various research studies done in South Africa and globally by the World Bank are analysed to understand how logistics and supply chain management can assist local companies with improving competitiveness. The public sector in South Africa has responded well to the imperatives of efficient supply chains and examples of official strategies and published policies are briefly discussed. One such policy under consideration is to move freight from road to rail and the typical characteristics of rail-friendly and road-friendly freight are discussed as well as the use of logistics hubs and inland intermodal terminals in an attempt to move freight from road to rail. The paper covers logistics and the supply chain of the future with some comments on disruptive technologies that may challenge our thinking of the way forward. Logistics and supply chain management are shown to be indeed useful enablers for improving competitiveness.

1. SETTING THE SCENE

Supply chains compete and not products, commodities or companies (Christopher, 2016). This implies that should businesses in South Africa want to gain, maintain or improve their competitive edge, the respective supply chains would need to provide smooth movement of goods from origins to destinations as well as movement in the opposite direction, referred to as reverse logistics.

Five of the traditional six "**P**s" of the marketing mix, namely **P**rice, **P**romotion, **P**roduct, **P**eople and **P**rocess, leave little space for innovation. Competitive pricing and global competition prevent price from providing that leverage, promotion opportunities and techniques are relatively standard, product specifications and features have moved closer in competing brands, people resources are relatively equal and the processes used are

similar. This leaves us with the importance of the sixth "**P**", namely **P**lace utility, which presents an important source of maintaining or gaining the competitive edge. Place utility, or availability of the right product at the right place at the right time, can only be achieved if proper logistics and supply chain management has been introduced and implemented throughout the business. This is why many leading organisations have recognised the need to develop more formal approaches to logistics and supply chain management in general, and transport in particular.

2. DEFINING LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Various definitions of logistics and supply chain management are used in practice and it might be convenient to use a diagram to explain the concept for purpose of this discussion. This is presented in **Figure 1** (Adapted from De Villiers, *et al*, 2017) and indicates a flow of materials, products, commodities and cargo (collectively called "goods") from the supplier (inbound) side to the customer (outbound) side.

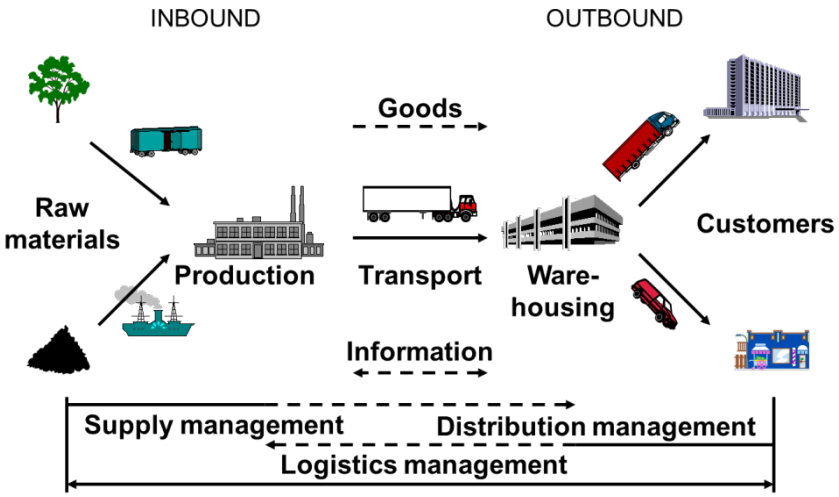

Figure 1: Logistics, supply and distribution management

Raw materials are sourced and enter the supply chain on the inbound side and finished products or services exit the supply chain on the outbound side, with goods moving through the supply chain from origin to destination and information moving both forward and backwards through the supply chain. Reverse logistics moves upstream and includes goods returned, value carriers returned (such as pallets and empty gas bottles), disposal of assets, recycling materials, packaging materials and waste. The logistics functions or elements include transport, warehousing, inventory management, procurement, logistics information systems, materials handling, order management, customer service, packaging, reverse logistics, freight forwarding and customs clearing. Supply chain management usually refers to the integration of all these logistics functions or elements to provide seamless movement from the suppliers of the suppliers (upstream) to the customers of the customers (downstream).

3. IMPORTANCE OF LOGISTICS

The cost of logistics is a key performance indicator of the supply chain that has to be carefully monitored and managed to be able to allow the supply chains to compete effectively. Research at the CSIR (2014) indicates that total logistics costs in South Africa are around 12% of gross domestic product (GDP), significantly higher than the similarly calculated figure of 8% in the USA (CSCMP, 2014). A breakdown of our logistics costs for 2014 is as follows:

- Transport: 58.8%
- Inventory carrying costs: 13.5%
- Management and administration: 12.4%
- Warehousing: 12.3%
- Fuel inflation: 3.0%

  Total: 100.0%

It is clear that transport costs are by far the single most important contributor and much higher than the global average of around 40%. Part of the reason is the geographical reality that the industrial heartland of Gauteng, which is responsible for about 34% of South Africa's GDP with 25% of the population, is located about 570km from Durban and 1 400km from Cape Town. This requires that all imports and exports need to be moved over long distances at significant costs.

Another reason is that rail transport, which is supposed to be more cost effective than road transport over this distance, is not able to attract rail-friendly traffic. Operational efficiency of the rail service provider (Transnet Freight Rail) can be improved but it is true that rail transport globally is losing freight to road transport. Benefits of road transport include door-to-door distribution, overnight transport from Durban to Gauteng, competitive pricing due to backhaul possibilities, reliability and flexible services.

Cost is indeed important but time in transit should also be considered, as goods in transit imply rail transport can compete reasonably well with road transport when measured from terminal to terminal or hub to hub, but the time of goods in transit should be converted to inventory carrying cost and at an average rate of 25% of the value of the goods per annum (cost of capital, obsolescence, pilferage, insurance, warehousing, etc.), excessive time in transit can become very expensive.

4. TRANSPORT MODE COMPARISON

The choice of most suitable or appropriate mode for freight (air cargo, goods by rail or commodities) depends on economic, service, functionality and related characteristics of the respective modes. It is important to choose modes with due consideration of mode-friendly traffic, such as rail-friendly or road-friendly traffic. Transport economic realities determine which mode is the best and **Figure 2** (Adapted from De Villiers, *et al*, 2017)

provides the typical (albeit very much generalised) relationship between load, distance and speed for the five primary transport modes.

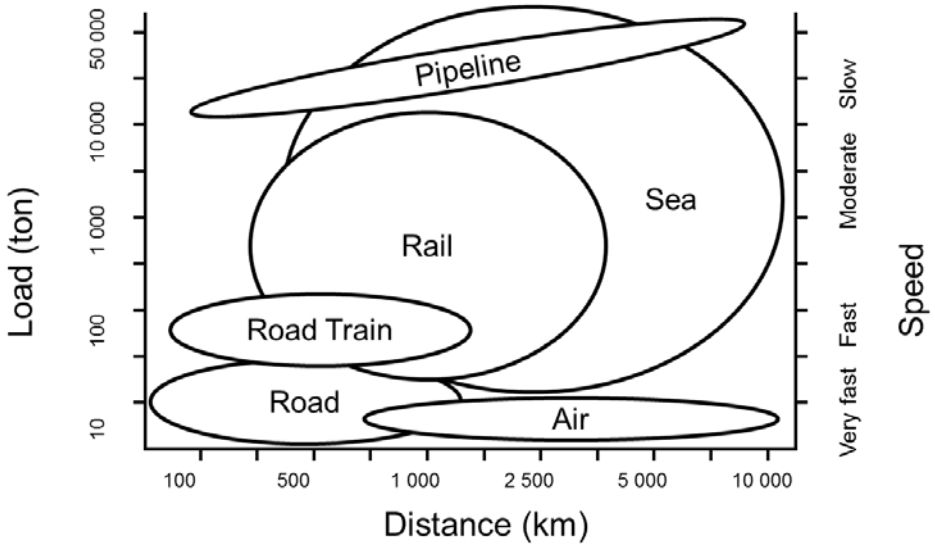

Figure 2 Transport mode load, distance and speed relationship

The use of containers in intermodal transport has increased for intercontinental imports and exports but the arrival of the tautliner or curtainsider trucks has impacted negatively on the local use of containers. The tautliner trucks can load more pallets on the same footprint of containers, which results in significantly lower transport costs per load.

De Villiers (2016) explains that loading of these trucks can be done from the back door as well as from both sides as the PVC tarpaulins can be removed to allow free access for forklift trucks. The savings are even more significant when the tautliner trucks are used in interlink combinations, as the potential saving is more due to the larger load area on the interlink combination. The calculation of the potential savings is indicated in **Figure 3** and shows that a tautliner interlink combination can carry 24% more pallets than the same loading area in one 6m container and one 12m container, on a similar interlink combination. This saving does not include the saving of the container return fee if the consignment is intended for the hinterland, as the container stays behind and does not have to be transported back from the hinterland.

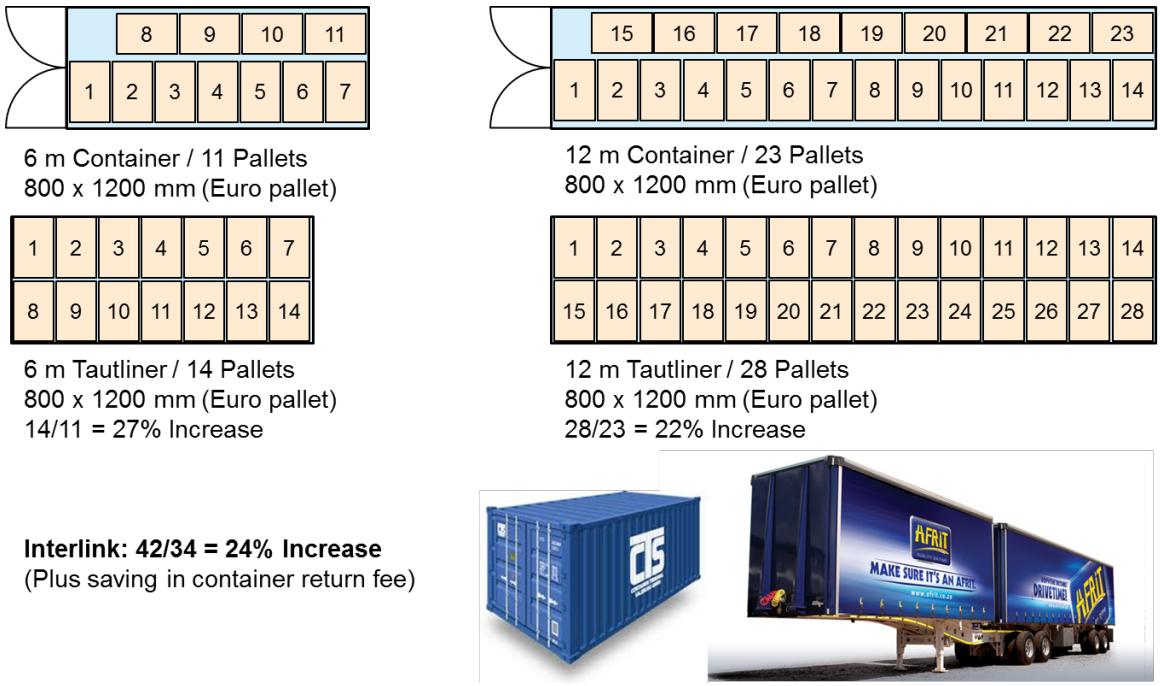

Figure 3 Comparison of container and tautliner capacities for pallets

In practice, it means that import containers destined for Gauteng are cleared and unpacked in Durban, where the pallets are transferred to tautliner trucks, which bring the pallets to Gauteng. The containers are left in Durban and do not have to be transported to Gauteng, which reduces the turn-in fee significantly.

5. INLAND INTERMODAL TERMINALS

Inland intermodal terminals have been developed to integrate various individual components in adding logistics value at a facility that acts as an intermediary in the supply chain. This concept works on a "hub-and-spoke" principle, where containers are received from various origins by unit or block trains to the central hub, and distributed to the destinations, usually by road. Benefits accrue to all parties by offering consolidation services for both imports and exports, as well as utilising the unit or block train concept, which streamlines the rail transport side significantly (Schoeman, 2015).

6. STATE OF LOGISTICS IN SOUTH AFRICA

6.1. Logistics Performance Index

The World Bank has been doing a regular survey on comparative logistics performance of most countries since 2007 (World Bank, 2016). The following components were analysed in the latest survey, "The Logistics Performance Index and Its Indicators":

- 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;
- The ability to track and trace consignments; and
- The frequency with which shipments reach consignees within scheduled or expected delivery times.

The results for South Africa since 2007 is presented in **Figure 4**.

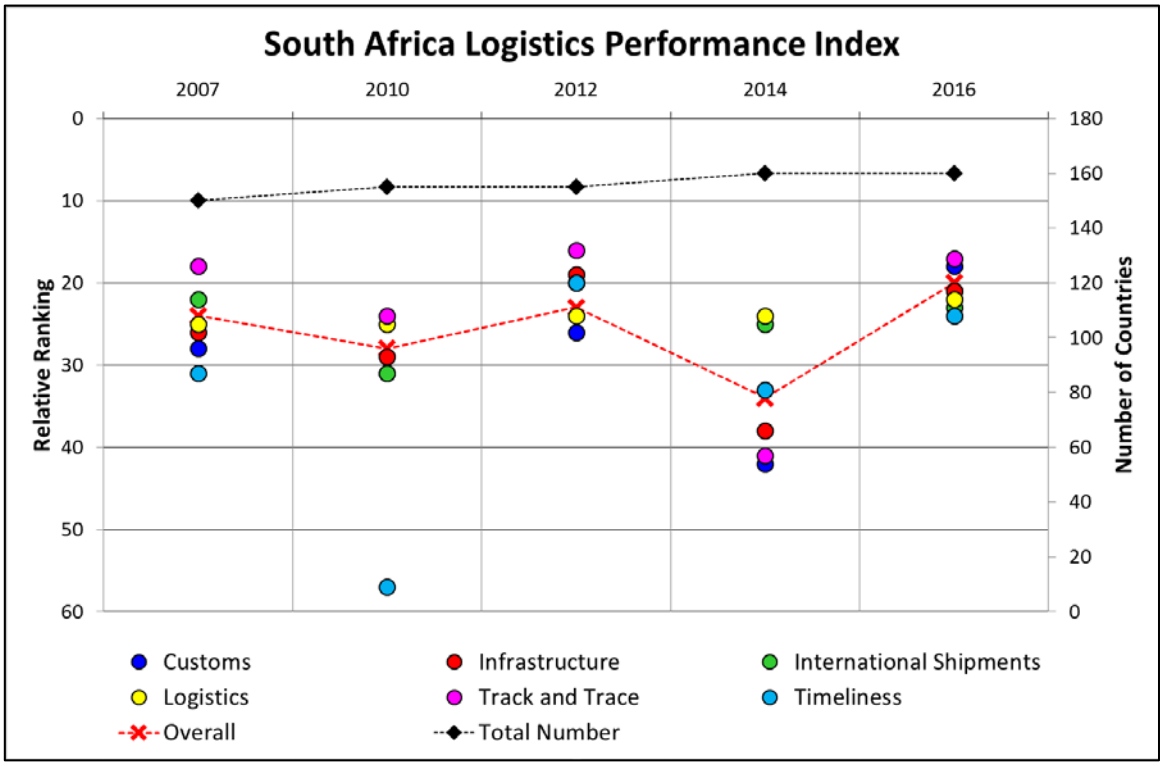

Figure 4 South Africa's Logistics Performance Index

It is clear from the results that South Africa has managed to improve their overall ranking to 20th out of 160 countries. This is indeed remarkable and is a significant improvement from the 34th ranking in 2014. Improvement was recorded in all six measurement indicators.

6.2. supplychainforesight Report

Since its inception in 2003, the **supply**chain**foresight** survey has grown annually in size and stature, achieving a useful mechanism that has found favour with businesses, academia and public enterprises. It has also provided a measure of performance and identification of trends and opportunities for South African businesses and their supply chains. It has grown to include specialised studies on issues such as Africa, and more recently the Middle East, exploring the changes taking place in supply chain management in the Gulf Corporation Council (GCC) states.

Respondents to the **supply**chain**foresight** survey (Barloworld Logistics, 2014) have indicated the necessity of aligning the supply chain strategy to the business strategy to

drive success. In this report there is a clear correlation between the two with the supply chain being viewed as an integral strategic and tactical component.

Figure 5 indicates that improving service levels to customers remains respondents' key strategic supply chain objective. This is for the third year in a row. It also ranks as the top priority in comparison to other objectives. Similar to the strategic business objectives, the remaining supply chain objectives would all contribute to enhancing service levels to customers.

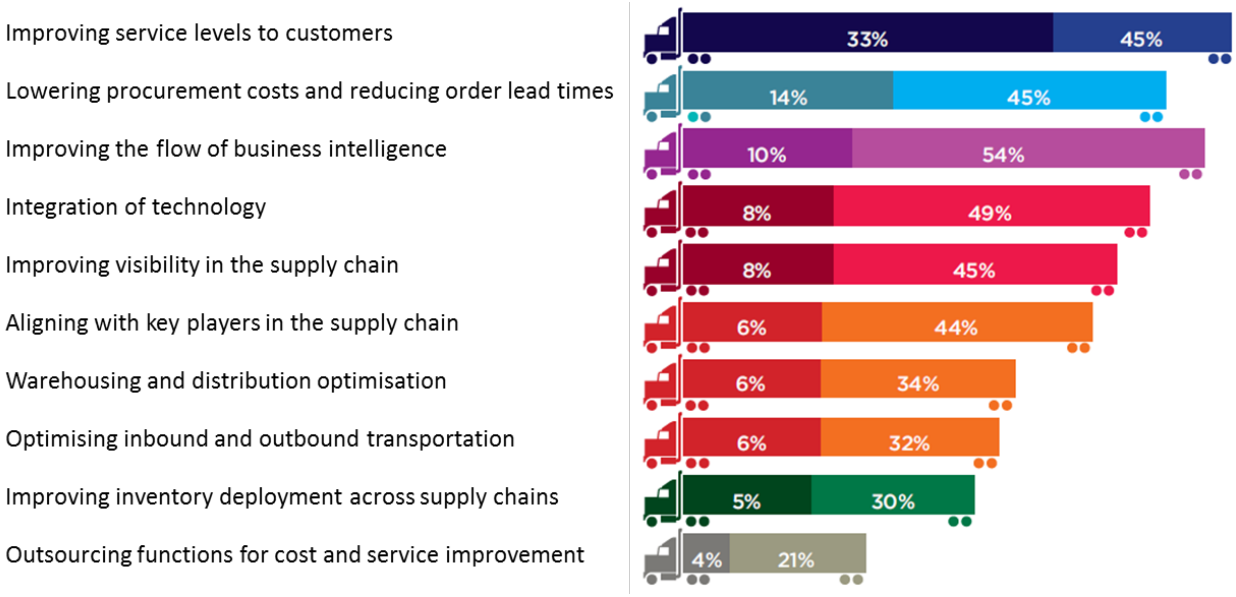

Figure 5 Top three supply chain and logistics objectives over the next 5 - 10 years (Source: supplychain**foresight Report 2014)**

The latest **supply**chain**foresight** survey (Barloworld Logistics, 2016) reviewed the elements impacting the supply chain and they found that the respondents to this year's survey show the strong focus on a diverse range of supply chain factors that is delivering significant value to their companies. Universally, the alignment of the supply chain strategy with the business strategy has become more critical and is delivering very positive results for South African businesses. The integration of customers into the supply chain is recognised as an approach which delivers improved customer centricity, enabling improved performance and satisfaction levels. The strong focus on collaborative strategies is widespread and most likely adopted to minimise cost and reap the benefits of smart partnerships.

6.3. SA Logistics Barometer

The Logistics Barometer (2015) is a new platform with a deeper focus on logistics costs and their drivers. The first edition takes the opportunity to further refine the methodology used to calculate logistics costs. At the same time Statistics South Africa revised their historic GDP figures. The time series was recalculated using the updated GDP data and the refined methodology.

Logistics puts freight at the right place, at the right time. Expressing the cost of this place and time utility as a percentage of GDP is the benchmark in gauging logistics efficiency and the impact of cost drivers on the industry. South Africa's logistics costs as a percentage of GDP in 2013 was 11.1% which is higher than developed countries but competitive when compared to other developing regions.

The 11.1% of 2013 is 0.5 percentage points down from 2012 as a direct result of more efficient last mile distribution. The diesel price hikes endured in 2013 spurred a drive towards more efficient supply chain management, reducing the number of tonne-kilometres spent on last mile distribution. The impact of the industry response clearly offsets the impact of the fuel price hike in that year. Since 2013 it is estimated that the logistics costs as percentage of GDP rose to 11.4% in 2014 and will rise further to 11.7% in 2015 (given specific industry assumptions). The brief respite in fuel prices enjoyed recently could possibly ease the focus on efficient last mile distribution, adding back the tonne-kilometres in future, but overall the consistent upward creep in input costs is the underlying reason for this outlook.

Expressing logistics costs as a percentage of transportable GDP paints a slightly starker picture, inching over the 50% mark from 2012 onwards. This implies that half of the landed cost of agriculture, mining and manufacturing goods is incurred by ensuring products are at the right place, at the right time. Clearly logistics deserves special attention - not only in industry boardrooms, but also within government.

Providing the logistics services for South Africa's economic commodities in 2013 accrued R393 billion which was 3.5% (R14 billion) more than in 2012. Taking inflation into account the real logistics costs for 2013 were actually lower than for 2012.

7. PUBLIC SECTOR PERSPECTIVES

7.1. Department of Transport

The National Freight Logistics Strategy of 2005 (Department of Transport, 2005) is currently under review and the new report is expected soon. However, the previous version of the National Freight Logistics Strategy provided good insight into the challenges facing freight transport such as:

- Service delivery constraints:
  - Delivery capability of port and rail sector; and
  - Customer focus is poor.

- Infrastructure and capacity constraints within the transportation network:
  - Provincial roads (road maintenance, enforcement); and
  - Improved rail and port infrastructure.

- Regulatory challenges and implications for the delivery of efficient transport services:
  - Role of public sector in rail, ports, pipeline, airports;
  - Regulatory oversight over monopoly industries; and
  - Enhanced efficiency - parastatals and the role of the private sector.

It is fair to suggest that those challenges are still relevant.

The strategic goals of the Department of Transport, related to freight logistics, as presented in their Strategic Plan (Department of Transport, 2013) include:

- An efficient and integrated infrastructure network that serves as a catalyst for social and economic development. This implies the increase of transport infrastructure efficiencies and ensure seamless integrated movement of freight and reduce system costs; and

- A transport sector that is safe and secure. This implies the reduction of the number of fatalities on the road by 50% and incidents and occurrences in the rail environment by 5% by 2014.

The successful implementation of world-class logistics and supply chain management solutions requires collaboration between numbers of stakeholders in the supply chain, such as logistics service providers, cargo owners, local, provincial and national government as well as regional cooperation. The role of the private sector stakeholders is of particular importance when it comes to the funding of logistics infrastructure and services, as well as governance and compliance to remain within the law.

A good example is the performance based standards (PBS) scheme for heavy vehicles, which is currently the basis for the PBS/"Smart Trucks" demonstration project in South Africa. A set of safety-critical manoeuvres is prescribed, and vehicles must be tested or simulated while performing each manoeuvre. Selected vehicle performance parameters are measured and compared with the minimum/maximum levels deemed safe. Each performance standard addresses a selected aspect of vehicle behaviour deemed critical to vehicle safety. A road transport management system (RTMS) with self-regulation is a non-negotiable pre-requisite for participation in the scheme (Nordengen and Roux, 2014).

7.2. Transnet Limited

The new Group Chief Executive of Transnet, Siyabonga Gama, has published four strategic thrusts to assist with the implementation of their market demand strategy (Transnet, 2016), namely:

- **AGILE** - Fit and focused in a volatile world
- **ADMIRED** - Trusted, innovative South African brand
- **DIGITAL** - Evolve or die
- **UNITED** - Together we succeed

Annual results for the year ended 31 March 2016 include the following:

- Revenue up 1.7% to R62.2 billion;
- Operating costs contained at R35.9 billion;
- EBITDA grew by 2.6% to R26.3 billion, 4.3 times GDP growth of 0.6%;
- Capital investment at R29.6 billion, bringing the spend during the MDS period to R124 billion;
- Capital programme revised upwards to R340 billion - R380 billion over the next 10 years;
- Cash generated from operations increased by 1.7% to R27.7 billion;
- Gearing at 43.1% and cash interest cover at 3.1 times;
- Group operational efficiency increased by 15.9%;
- Maintained an investment grade credit rating, confirming the company's standalone credit profile; and
- B-BBEE spend of R43.5 billion or 100.6% of total measured procurement spend for the year, per DTI codes.

7.3. National Development Plan

The National Development Plan (NPC, 2012) refers in a number of places to logistics hubs, transport, warehousing and related functions, as indicated in the following extracts:

- **Chapter 3:** Economy and employment - Key drivers of change:
  - Lowering the costs of transport and logistics and investing in remedies to address spatial divides; and
  - Industrial zone developments and trade promotion will rely on competitive logistics.
- **Chapter 7:** Trade facilitation frameworks - Positioning South Africa in the world:
  - Creating adequate warehousing and logistics facilities; and
  - Instituting efficient procedures and customs and border posts.
- **Chapter 8:** Transforming human settlement and the national space economy:
  - The corridor of logistics hubs, road, rail, fuel and other infrastructure, including and connecting Gauteng and Durban, is vital to the future of the national economy; and

- Presidential Infrastructure Coordinating Commission (PICS) defined 17 Strategic Integrated Projects (SIP) of which No 2 deals with the Durban- Free State - Gauteng Logistics and Industrial Corridor.

8. FIRM LEVEL LOGISTICS PERFORMANCE

The strategic profit model, also called "DuPont model", provides one method for calculating the return on equity. Return on equity refers to a business's profit relative to shareholder equity or, put another way - the effectiveness of the business at turning assets and investments into profit (Stock and Lambert, 2001). The top part of the equation as presented in **Figure 6** covers the income statement while the bottom part reflects the balance sheet. The parameters on the right (shaded) are the variables that could be manipulated to increase or decrease the financial indicators on the left side of the equation.

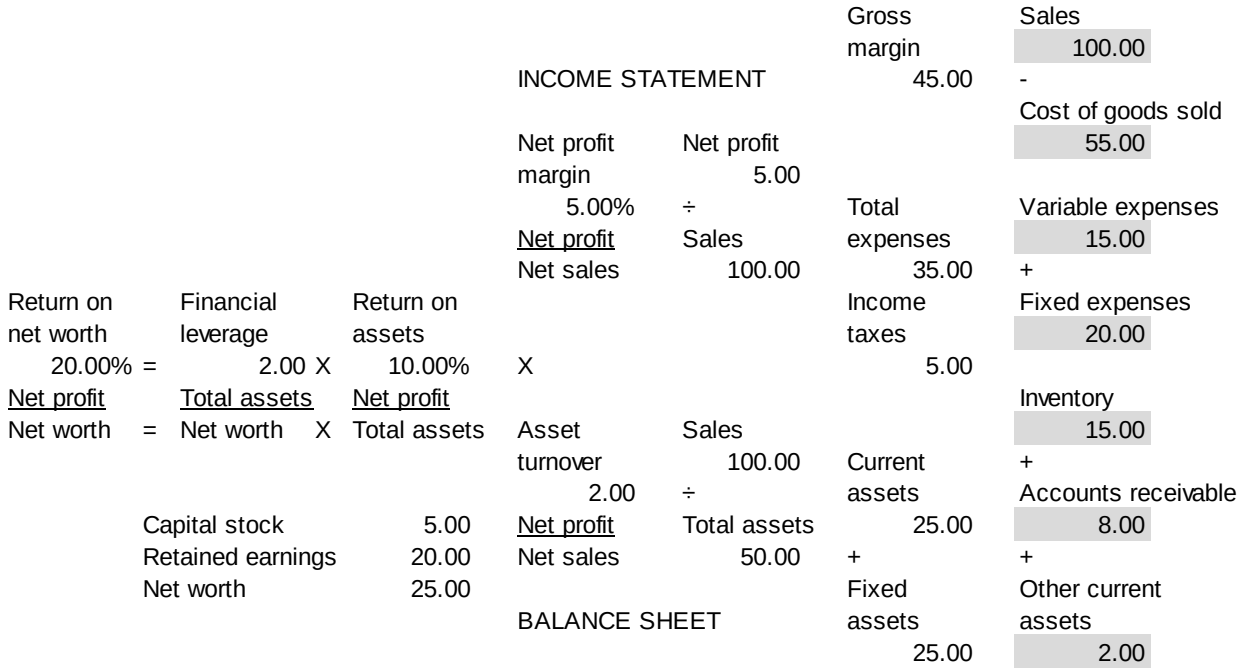

Figure 6 Strategic profit model

Changes in the variable parameters on the right side can impact the financial indicators of the firm in different ways, as indicated in **Table 1**.

Table 1 Logistics' impact in the strategic profit model

Category		Description	Impact	
Income statement		Sales	• Sales increase due to better customer service	
		Cost of goods sold	• Lower cost due to new or more efficient manufacturing facilities • Lower cost of purchased materials	
		Variable expenses	• Reduced order management costs	• Fewer freight claims • Lower freight costs

Category		Description	Impact	
			• Fewer last minute production changes • Fewer less-than-truck-load (LTL) shipments	• Lower insurance costs • Reduced taxes • Variable storage costs • Lower inventory risk costs
		Fixed expenses	• Fewer employees required • Lower third-party warehousing costs	• Reduced information system costs • Reduced cost of supervision
Balance sheet		Inventory	• Reduced inventory investment	
		Accounts receivable	• Reduced accounts receivable due to more promptly paying customers (lower errors)	
		Other current assets	• Less warehouse space required • Increased investment in modernised production facilities	

9. THE SUPPLY CHAIN OF THE FUTURE

Christopher (2016) dedicates the last chapter of his latest book to the supply chain of the future and he identifies the following megatrends that will impact the shape of supply chains in the future:

- A projected increase in the world's population from 7 billion today to over 9 billion by 2050; with different age profiles across countries, resulting in more migration;

- The UN reports that at the moment half of the world's population live in urban areas and by 2050 about 70% will be city dwellers; with more focus on city logistics, and

- The trend towards a redistribution of wealth from the western world to the newly emerging economies will continue; which may well make existing supply chain arrangements less than optimal.

Other changes in future include:

- Shifting centres of gravity will influence the choice between centralisation and decentralisation;

- Increased importance of supply chain governance and compliance due to pressure from customers;

- Business models of the past will change and we need to be more adaptable;

- Structural flexibility will be needed to allow supply chains to adapt or reconfigure in response to major change on the demand or supply side; and

- Waste in the supply chain will have to be reduced through collaboration and information sharing.

Finally, some global trends and disruptive technologies that will impact local supply chains, include:

- Driverless vehicles;
- Drones and other remotely controlled devices;
- Information and communications developments;
- Sustainable energy;
- Urban or city logistics;
- 3D printing; and
- Increased trade within Sub-Saharan Africa.

10. CONCLUSION

So, what can logistics do to assist businesses in South Africa to gain, maintain or improve their competitive edge?

If we focus on the main logistics functions, it seems that transport provides for low hanging fruit, due to the significant contribution to logistics costs. We have to improve efficiency of rail transport to facilitate movement of freight from road to rail. This should be supported by the development of a network of inland intermodal terminals that are located at the respective centres-of-gravity to ensure that the "first mile" and "last mile" costs are optimised. These are the most expensive parts of the supply chain.

From a warehousing perspective, centralisation at the centres-of-gravity (similar to terminals) can reduce costs although centralisation should not necessarily be regarded as the answer for all networks. It remains important to design networks for service sensitive or cost sensitive supply chains appropriate for their respective needs, and not "one size fits all".

Stockholding or inventory carrying costs are often ignored or incorrectly reflected in financial figures but contribute to a large part of logistics costs. The best way to address unnecessary high levels of stock is with suitable information systems, because if you know where stock is, you do not have to carry it in all the places. Inventory is not the "root of

evil", but the "flower of evil" and when excessive inventory emerges, it is time to dig deeper.

Finally, skills development should be on the radar screen of all stakeholders as technology developments and increased global and regional competition are continually putting pressure on local business. Tertiary institutes such as the Universities of Pretoria, Johannesburg and Stellenbosch offer globally accredited qualifications in logistics and supply chain management and together with higher education facilities, should form part of the career development plans of logistics and supply chain management practitioners.

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