THE STATE OF LOGISTICS IN SOUTH AFRICA – sustainable improvements or continued exposure to risk

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ABSTRACT

It is illustrated that logistics cost for South Africa can be measured in an extensive model and cost drivers are identified. The model is also backdated for six years to enable the analysis of trends. Understanding the drivers and trends enable the development of specific analysis areas (i.e. effect of movement of freight from road to rail, industry level analysis can be done on logistic cost elements) that can be considered by industry and managed by government on a macro-economic level.

The research results highlight the fallible structure of South Africa’s freight transport industry with the majority of long distance transport provided by road haulers. Logistics cost the South African economy R339 billion or 14.7% of GDP in 2008. This figure is 50% higher than for most developed economies (US was 9.9% in 2006 (Wilson, 2006: 2)) and the underlying weaknesses in the logistics system must be addressed urgently. This research points the way to specific solutions to achieve this objective.

The research also indicates the origin of externality costs caused by the current structure, and provides insight into policy decision-making as to the desired structure of a transport structure that can be sustainable and more competitive.

INTRODUCTION

As far as the performance of logistics as a cost to the economy is concerned, the Delaney survey is the most well-known macro-measurement of logistics costs globally (the 19th edition was issued in June 2008). The survey makes use of a variety of methodologies, outlined by Robert Delaney (1987) in a policy position paper (three years before the publication of his first annual state of logistics report). Alford-Bangs’ approach (1946) is used to calculate inventory carrying charges and their work of 1955 is cited. This approach is confirmed by Cooke (2004) when he states that the methodology “preserves” the original Alford-Bangs approach.

Certain aspects of South Africa’s logistics cost situation still require significant attention, but it is also heartening to note that wide consensus exists amongst logistics stakeholders on many important initiatives. As the results of the previous five studies were shared, dialogue ensued and it is with satisfaction, but also with gratitude, that the researchers observe the application of the research results in facilitating consensus amongst logistics industry stakeholders. In this way, one of the objectives for South Africa’s logistics cost survey (articulated in the first survey over five years ago (CSIR, 2004) is most certainly being achieved.
The methodology of calculating logistics costs used by the state of logistics study has been evolving since the first survey as described by Botes, Jacobs and Pienaar (2006, 1-18). The latest methodology was well documented in especially the fourth publication (Havenga, Jacobs, Pienaar, Van Eeden, 2007, 14-16). In brief, the logistics cost model employs a ‘bottom-up’ approach for the computation of logistics costs by aggregating detailed commodity-specific data. The aggregation of logistics costs is based on primary input elements (the supply of a specific commodity) and the costs of performing logistical tasks with respect to that commodity (Havenga et al., 2007: 14). The logistical tasks that are measured are transport, storage and ports, management and administration, and inventory carrying cost.

The purpose of the research presented in this paper is four-fold: (i) to measure the cost of logistics in South Africa, (ii) to back-calculate logistics cost to enable trend analysis, (iii) to determine the major cost drivers and (iv) to facilitate both macro- and micro-economic management of logistics cost.

These research objectives were met by employing a quantitative approach based on a gravity-orientated freight flow model, a road transport cost model (actual road transport costs are not freely available in South Africa), actual transport costs for other modes, a warehousing cost survey and an inventory delay calculation for the economy (to inform warehousing cost calculations and inventory financing costs). The measurement is on both a national and industry level and can therefore relate logistics cost with GDP as well as with industry-level turnover. Research pitfalls are highlighted and guidelines provided for the application of the research approach in other economies.

1. COST OF LOGISTICS RESULTS

The latest survey indicates an improvement in the cost of logistics for South Africa, compared to the country’s GDP (Figure 1), i.e a decrease from 15.9% to 14.7% of GDP. This figure is 50% higher than for most developed economies (US was 9.9% in 2006 (Wilson, 2006: 2)) and the underlying weaknesses in the logistics system must be addressed urgently.

![Figure 1: Logistics costs for South Africa](image-url)
Logistics cost relative to GDP is at its lowest level since the inception of the survey and transport cost increases are also lower than in any of the previous surveys. On the surface, it could be interpreted that the desired results are finally being achieved. It is however critical to understand whether it is an intrinsic improvement in transport efficiency that is at play, or whether there are external factors at play, as alluded to in previous surveys (CSIR, 2010). In order to answer this question the significant impact of both the most important extrinsic factor (fuel prices) and intrinsic factor (improvement of load factors) are considered below.

2. FUEL PRICE SCENARIOS

As depicted in Figure 2, road transport is by far the largest contributor to transport costs in South Africa. Road transport cost drivers were analysed in the previous survey (Havenga, J.H., Simpson, Z., and Van Eeden J., 2009: 27) and the economy’s serious exposure to the cost of fuel explained. South Africa’s logistics industry narrowly avoided a serious challenge when the oil price, which increased significantly during mid 2008, suddenly decreased markedly. The very real risk is however still present and illustrated in Figure 2 by two fuel cost scenarios.

If the fuel price was to triple, logistics costs would rise with 53% in 2008 terms and under 2008’s conditions. This scenario is unfortunately quite realistic. The oil price is a highly unstable global phenomenon, evidenced again by the significant fluctuations over the past decade with a low of $17 in January 1999 and a peak of $147 in July 2008 (Wikipedia, 2010). The short term fluctuations are just as disconcerting. The oil price broke through $100 dollars per barrel on 2 January 2008, and reached $147.27 on 11 July 2008. It steadily declined with the economic recession to $33.87 a barrel on 21 December 2008. The average price for 2008 ($91.48) was 42.5% higher than in 2007 ($64.20) (Inflationdata.com, 2010). Many economists who dare to forecast it see a possible doubling towards the middle of this decade as a highly likely scenario.

![Figure 2: Impact of higher fuel price scenarios on total transport costs](image-url)
Though all economies are affected by it, South Africa’s higher than normal transport demand and poor configuration (as discussed in previous surveys (CSIR, 2010) means that the economy will be affected more than average (a worsening of the relative position), as illustrated in Figure 3.

A triple fuel cost scenario translates into a rise in transport cost as a percentage of total logistics costs from half to two thirds (a rise of 14% compared to the calculated world average rise of 8%). Transport costs (on its own) as percentage of GDP, will rise from 7.4% to 12.8%. Ironically, the pronounced oil price fluctuations of 2008 led to a serious drive by many freight transport service providers and freight owners to improve efficiency through load factor improvements.

![Figure 3: Relative effect of fuel price scenarios](image)

Eliminating empty legs has been an important objective for many years, but these events made improvements even more critical. In logistics terms an important trade-off was also highlighted. Smaller consignments with lower levels of consolidation (to reduce inventory) are a primary cause of empty legs. At some point, however, managing the increasing transport costs will become more important than managing inventory carrying costs; especially for an economy with a significant road transport market share such as South Africa.

This approach also has a limit, i.e. complete elimination of empty legs, and for corridor transport (which constitutes two-thirds of total transport costs) this objective is very close to being reached. Thereafter the threat of significant and detrimental oil price rises could only be mitigated by modal shift. The recent increase in electricity tariffs will have an impact on the rail cost however, and should be calculated in future studies.

In order to continue with the current improvement in efficiencies, fuel saving initiatives needs to be developed, that will require a new level of thinking for the transport industry. Road transport service providers can however only increase up to certain natural limits,
and then the total system needs to be redesigned to gain significant increases in efficiency, which might require intermodal solutions that move the energy demand from fuel to electricity and eventually to renewable electricity.

3. STORAGE AND INVENTORY CARRYING COSTS

Costs associated with storing inventory are largely influenced by inventory volume and how long it is stored (managed by logisticians) on the one hand and then the cost of storage and the interest rates (largely “administered costs”, especially for interest rates, over which the logisticians has no or little control) on the other hand. Table 1 reflects an analysis of the changes in storage costs.

Table 1: Changes in storage costs

<table>
<thead>
<tr>
<th>Factor incurring change</th>
<th>R billion</th>
</tr>
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<tbody>
<tr>
<td>Inflation</td>
<td>+3.7</td>
</tr>
<tr>
<td>Increase in storage volume</td>
<td>-1.8</td>
</tr>
<tr>
<td>Storage cost increase above (decrease below) inflation</td>
<td>-4.3</td>
</tr>
<tr>
<td>Delay in inventory</td>
<td>+3.6</td>
</tr>
<tr>
<td>Total increase in storage costs</td>
<td>+1.2</td>
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</tbody>
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The R1.2 billion net increase for storage costs, specifically, is a result of storing slightly less inventory for a longer period of time at slightly less real storage rates – a mixed result for efficiency and positive result as far as price increases (price negotiation ability) is concerned. Unfortunately the positive effect of lower storage rates is negated by higher inventory carrying costs.

The trend in inventory carrying costs, which once again were much higher in 2008 (21.2% higher than in 2007), is illustrated in Figure 4. The reasons for the increase in inventory carrying costs are twofold, firstly the average weighted interest rate increased from 13% to 15% between 2007 and 2008, and secondly the levels of inventory increased. The change in interest rates contributed 40% to the increase in inventory carrying costs, while the increase in inventory levels contributed the remaining 60% of the increase.

Figure 4: Logistics cost growth at current prices and 2008 cost contribution
4. CURRENT FREIGHT FLOW POSITION

Freight transport activity increased by 4% in 2008 in ton-kilometers shipped terms and 2% in tons shipped terms (Figure 5). The Average Transport Distance (ATD) has increased, but especially with rail freight indicating Rail’s focus on longer distance freight. Road corridor freight has increased by 11.2% based on ton-km, indicating that more than normal growth of freight volumes has been captured by this mode of transport. Rail continues to reduce its market share in the shorter distance rural and metropolitan markets. Although corridor freight only contributes 41% of all ton-km transported, it contributes almost two thirds of the total transport cost for South Africa. The higher tariffs of long distance road transport and the imbalance of road-rail distribution cause the anomaly where corridors contributes 26% of the tons and 41% of the ton-km transported, but contributes 66% to the total transport cost.

Figure 5: Modal distribution of road and rail freight in South Africa

The trend of flattening rail traffic volumes and the absorption of growth in traffic volumes on road continues, as evidenced by the growth in road corridor traffic (Figure 6). Transnet recently announced a major capital investment plan. Initial analysis suggests that this will have a positive impact on this position, but most probably not enough. Much more funding
is needed to develop more capacity, especially if domestic intermodal solutions come into play.

![Graph showing Bulk mining and corridor transport in South Africa since 1993]

**Figure 6: Bulk mining and corridor transport in South Africa since 1993**

5. **SUSTAINABILITY OF LOGISTICS SERVICE PROVISION**

Captains of industry recently interviewed by the Centre for Supply Chain Management indicated that the sustainability of logistics service provision is becoming ever more prominent and requires improved management from logistics service providers. Three key trends are emerging globally:

- Consumers are giving preference to economies that adhere to sustainability principles.
- Measurement of critical elements are becoming more transparent and are being used as bargaining tools, giving rise to phenomena such as emissions trading.
- Freight and inventory users are beginning to favour less harmful solutions.

Measurement of sustainability in logistics service provision is difficult, but in this survey an attempt is made to measure the externalities for the South African logistics system for the first time. Externality costs are estimated to add another R34 billion (or another 19%) to the South African transport bill (Figure 7). Externality cost measurements are still in its infancy and more detailed work is required. Some results were presented by Allen Jorgensen (2009) at the Africa Rail and SATC conferences in 2009, and the data in this section is based on his research. It is clear that the impact is significant.

Adding this cost to the cost of transport increases the cost percentage of transport from 7.4% to 8.8% of GDP. The combined effect of a tripling of the fuel price and the transparent accounting of externality costs could make the cost of transport 14.2%, relative to the GDP.
Figure 7: The impact of externality costs on total transport costs

The main contributors to externality costs are emissions and accidents, as illustrated in Figure 8. Previous surveys (CSIR, 2010) highlighted the advantages of a modal shift. The sustainability advantages in this regard are obvious with the much lower externality costs associated with rail transport.

Figure 8: The externality costs of transportation
6. CONCLUSION

The research results highlight the fallible structure of South Africa’s freight transport industry with the majority of long distance transport provided by road hauliers. Some of the key challenges resulting from the status quo are the unsustainably high freight transport costs (approximately 15% of GDP, 50% higher than for most developed economies (Wilson, 2006: 2)).

Given the significant contribution of fuel costs to total transport costs, and the exogenous volatility of its input commodity, the mitigation of this risk remains prominent on the road haulage industry’s and freight owners’ strategic agendas.

In line with the global trends, the drive towards a more sustainable logistics system is also gaining prominence. Consolidation and other efforts to increase efficiency contributed to improvements, including the development of more fuel efficient equipment with lower emissions.

Two thirds of transport costs are incurred on long transport corridors and are mostly transported by road. The model also points to one of the critical solutions to the country’s logistics services – the provision of intermodal solutions which will not only draw from the strengths of the current role-players but also facilitate the establishment of a competitive freight transport industry to support economic growth and international competitiveness.

7. REFERENCES


