

# RAIL ECONOMIC REGULATION DISCUSSION IN SOUTH AFRICA

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## ABSTRACT

As the debate around vertical separation and open access intensified, it became necessary to do a critical evaluation of railway reform options and its applicability to South Africa. This paper addresses this issue. The issues surrounding vertical separation, privatisation and economic regulation have recently resurfaced in South Africa following a proposal by government to create a rail economic regulator. In particular, a framework was proposed that has the overarching objective of more efficient and effective rail services. To achieve this, rail economic regulation should be benchmarked internationally and key principles for a regulator should be developed.

## INTRODUCTION

Economic regulation in various industries, where a few dominant players exist (especially if these are state owned enterprises – but not limited to these institutions), is growing in South Africa. The phenomenon is quite common in the first world, but in many respects South Africa must still find its way. The Competition Act of 1998 came into effect in 1999 (Chetty, 2005, p. 4) and since then the visibility and size of the cases before the commission and the extent of fines has grown, but the process is still a mere decade old. Regulation in the electricity and energy markets are also quite new, but is also growing in visibility, with recent cases involving electricity tariffs, cell phone interconnectivity fees and pipeline tariffs.

Questions about rail economic regulation have also recently resurfaced in South Africa around discussions to create a rail economic regulator (“RER”) (Radebe, 2008). In a Department of Transport (“DoT”) position paper a particular framework was proposed that has an overarching objective of more efficient and effective rail services. To achieve this, rail economic regulation should be benchmarked internationally, key principles for a regulator (“RER”) should be developed (Khuthele Projects, 2007, p. 1-2) in line with the DoT’s strategic framework.

Recent events such as reform in rail passenger transport, the development of Gautrain and a new approach for branch lines provided impetus to new proposals for more overarching rail reforms. These reforms propose structural changes to achieve competition, private sector investment and quality improvements which will provide transparency and eliminate cross-subsidisation (op. cit. p. 2-5).

Freight transport plays an important strategic role and the paper maintains that the current framework allows for “monopolistic tendencies”, fiscal neglect and poor demand planning (op. cit. p. 8). Even though various options for reform exist (most importantly vertical integration with third party access or even horizontal separation or vertical separation) vertical separation in freight rail is specifically highlighted as the vision put forward by the

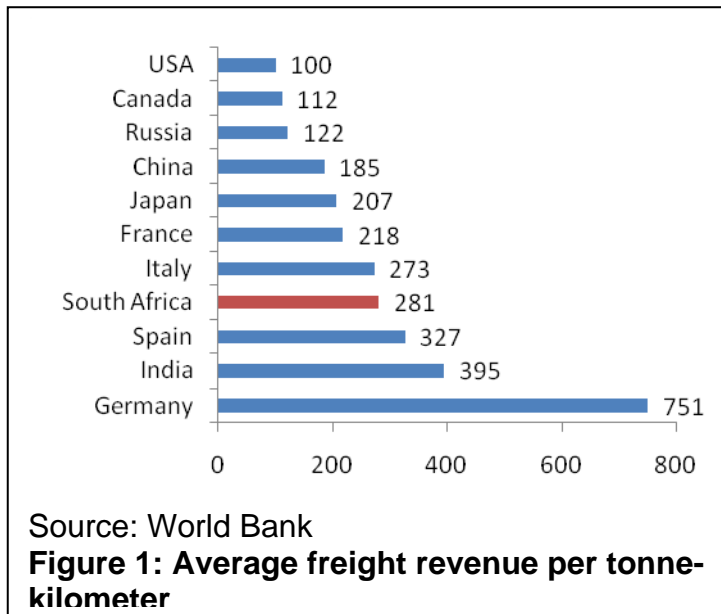
National Freight Logistics Strategy (“NFLS”) (op. cit. p. 31-32). It is envisaged that in the short to medium term third party access will be engineered (op. cit. p. 37), but possibly assumed that the long term vision would be vertical separation.

**GLOBAL PRACTICE**

The Khuthele report specifically mentions that many countries are in the process of rail reform and that the process is complex (Khuthele Projects, 2007, p. 11 and p. 19-20). A more specific view of the context and history of global practice are required.

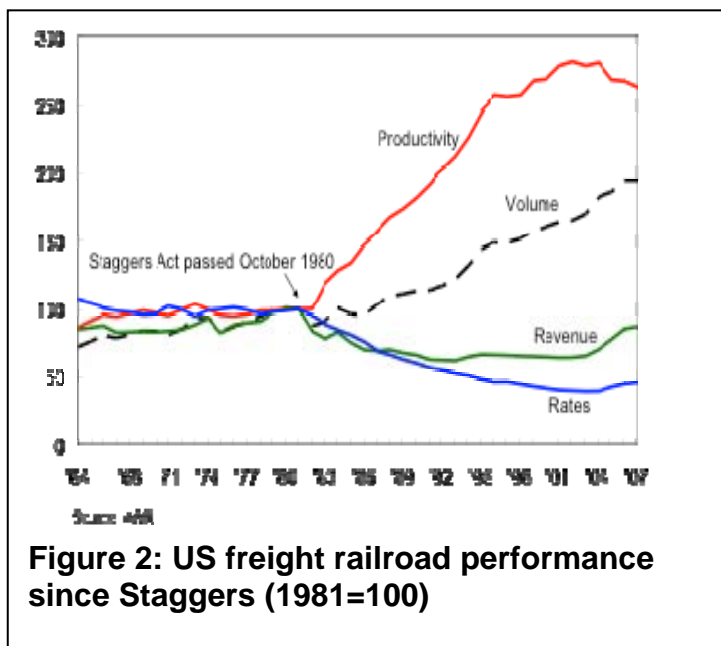
History

Following deregulation of surface transport services in many countries around two to three decades ago, modal competition was encouraged. The primary objectives were to enable free market principles, to encourage efficiency and effectiveness in surface transport and to allow rail services to become profitable, often to prepare the rail operators for privatisation.



Some specific case studies surfaced like the World Bank’s 2005 view that USA rail freight tariffs are the lowest in the world (Figure 1).

The argument is strengthened by an analysis of railroad performance in the USA (Figure 2).



But is this case study enough to provide a global reference in this regard? Many problems surfaced, indicating that not all the growth and optimisation objectives are reached with liberalisation. On the one hand certain bulk freight transport services in low-cost long-haul markets were “captured” by rail due to its nature, but on the other hand traffic that did switch to road caused structural inefficiencies (often described as the “tragedy of the commons” phenomenon) on a macro-economic scale. Initially, freight owners on a micro consignment level experienced better service levels due to increased competition. The loss of economies of scale on the rail network however caused higher rail costs and tariffs, with severe long term consequences on a national level. This was further exacerbated by the inappropriate allocation of externalities. Once the effect of these events on national

competitiveness became evident, governments were motivated to develop strategies to revitalise rail as a preferred mode for long distance transport with the key outcome of lowering the total freight cost of the economy.

Returning to the free market principle, vertical separation and open access were seen as apparent obvious solutions, but with closer scrutiny a different truth emerged. This approach is not unique to rail services and could be applied to a range of utilities such as telecommunications, postal services, and an energy or water supply. The approach and expected benefits for each utility will however differ. Pittman specifically refers to the rail sector and compares it to other utilities when he says that “one of the specific lessons of the experience to date is that the freight railways sector may not be a very promising sector for vertical separation.” He continues to say that “analysts throughout the world are coming to understand *ex post* much better than they did *ex ante* that there are a number of characteristics of the freight railways sector that do not seem to fit well with the assumptions and requirements of the vertical separation model” (Pittman, 2005, p.182).

In rail services the specific benefits that were expected to follow from vertical separation and/or open access were to encourage competition (as in Australia), facilitation of international services (as in Europe) and even to put different modes on an equal footing (as in Scandinavia) (Gomez-Ibanez and de Rus, 2006, p. 5). Focus on specific tasks by the rail infrastructure company which would lead to more efficient and effective maintenance is also sometimes mentioned, but specific failures in the United Kingdom and an analysis of other case studies has proven that when “specializing in mainly maintaining infrastructure, the maintenance cost is no different from the costs of integrated systems” (Mizutani and Shoji, 2004, p. 262).

Of these benefits only competition could be an issue in South Africa, as a very large percentage of current and medium term future traffic is considered domestic and because the road mode already enjoys significant statutory benefits over rail (rail market share for traffic that is considered “natural” for rail is extremely low and road hauliers’ contribution to fix infrastructure establishment, compared to rail, is very low.

### Status Quo

The different emphases placed on proposed vertical separation/open access processes as well as the motives behind it, lead to the rise of many different models for what was to be termed “rail reform”. These models can however be summarised as the British and Brussels approaches (Diaconu and Pittman, 2006, p. 2). The British model requires complete vertical separation, whereas the Brussels model maintains vertical integration while third party operators are allowed to use the vertically integrated operator’s infrastructure (sometimes called the “third party access” model). A further and separate dimension to these issues is the extent to which rail operators are privatised. (The Khuthele document is clear that third party access, i.e. the Brussels model should be engineered. The British model is tabled as the vision of the National Freight Logistics Strategy, but it is not, as such, supported in detail in the final document, i.e. the issue is left somewhat open). Despite the concepts of vertical separation and open access being around for more than a decade, success could at best be described as limited. By 2007, 97% of rail traffic was still handled by vertically integrated railways (Amos, 2007, p. 3).

## Failures and difficulties of vertical separation

Many reasons for failures or implementation difficulties are cited by researchers and experts in the logistics discipline, and are synthesised in this paragraph. The reasons include complexity, high costs of execution, loss of economies of scale, safety risks and information asymmetries<sup>1</sup>.

Paradoxically, the problems associated with information asymmetries during vertical separation and the successful processes to address it, leads to deep relationships between interested parties. The mooted advantages of vertical separation are then negated by the fact that an industry with a few highly specialised players and highly integrated operations will require these relationships to be successful (Sanchez, 2001, p. 7). This inevitably leads to “co-operation, quasi-reintegration, all that limit the role of market forces contrary to what was apparently planned in the first years of the railway reform” (Bouf et.al., op. cit., p. 11).

According to Pittman, “common sense and econometric analysis both suggest that the application of the reformers’ ”default option” of vertical separation in the freight railways sector may impose high costs on the system in their destruction of economies of vertical integration; thus arguments for the adoption of this option would seem to require the demonstration of high levels of corresponding benefits” (Pittman, 2005, p. 193). These benefits have been hard-pressed to find.

Many economies have also learned the hard way that whereas vertical separation and open access work well in some utilities, this is not necessarily true of railways, because of high proportions of fixed cost, upstream economies of scale and the locus of vertical separation (Pittman, 2005, p. 2-7). Research suggests that 25% of delivered costs of railroads are infrastructure costs (Thompson, 2003) versus 5% for electricity and 2.5% for gas. In addition, small power plants, for instance, can be almost as competitive as bigger plants (if not just as competitive), whereas density is the holy grail of railroads. In fact, it is at the interface point between fixed and rolling infrastructure where real efficiency can be gained (Sanchez, 2001, p. 83). Or as Pittman states “the effectiveness of the operations depends on the exact point where vertical integration or vertical separation takes place” (Pittman, 2005, p. 185).

In summary vertical separation in specifically freight railways must at best still be seen as an “experiment” (rather than the developing status quo as the Khuthele document imply), and the conditions under which the experiment could be attempted can be distilled from case studies. These conditions are:

1. The maturity and size of the economy - Mature and rich economies would normally have the depth of funding and required skill set to consider this possible change to vertical separation.
2. Density or potential density on the network - Low density networks do not benefit from economies of scale and could therefore also be a target, especially if governments are considering subsidies in a developmental context (in the South African context branch lines is a suggestion).
3. Number of clients and the number of origin-destination pairs (“OD’s”) - Many OD’s mean that a disconnect between the core network and operator is possible. In the case of a few OD’s the railway operates like a factory and integration is always

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<sup>1</sup> Burgeat, 2002, p. 43, Amos, 2007, p. 6, Pietrantino and Pelkmans, 2004, p. 35, Van de Velde and Van Reeve, 1999, p. 360, Pittman, 2005, p. 181, Bouf et.al., 2005, p. 11

better, especially if only a few clients are served, which will make it possible to integrate operations with terminals.

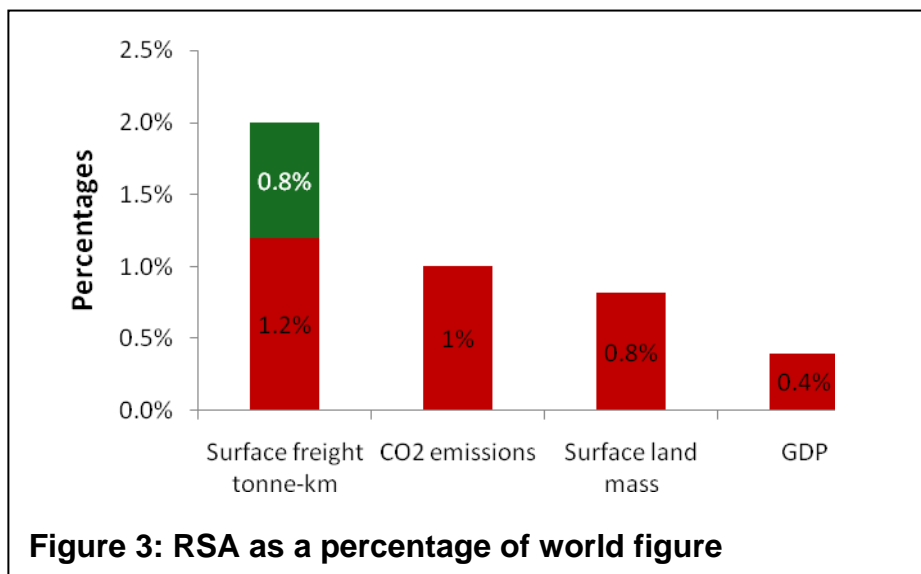
The crux of this evaluation is that these conditions should be researched specifically and applied to the South African condition, in order to determine the applicability of case studies around the world.

## **SOUTH AFRICA'S POSITION**

### The importance of costs

South Africa's transport costs as a percentage of total logistics costs are extremely high, currently at 50.4% compared to the global average of 41%.

It is true that for large countries this indicator is higher than the global average, but these countries' percentages are still lower than that of South Africa, e.g. the USA where it is currently 48% (Wilson, 2008, p.27). Large sprawling countries that are spatially challenged (due to location of industry relative to markets) will obviously attract higher transport costs, but South Africa's case is extreme as is evidenced by the World Bank's Logistics Performance Index "LPI" rating for domestic transport costs where South Africa ranks in



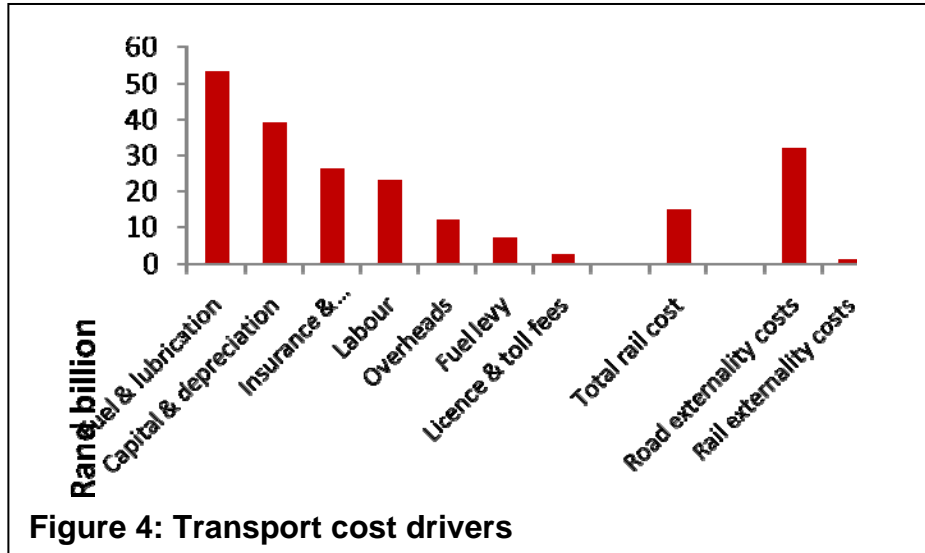
**Figure 3: RSA as a percentage of world figure**

the 124<sup>th</sup> position in the world, compared to an overall ranking for South Africa's logistics performance in the 24<sup>th</sup> position (Arvis, et. al. 2007, p. 27). As with many advanced economies (in which the same trend is visible) this must be an area of opportunity, but even more so for South Africa because transportation costs' relative contribution is much higher than for

these countries. The fact that South Africa's transportation unit costs (cost per tonne-kilometer) is in fact very low, caused by a low ratio of user contribution to infrastructure usage, the relatively low cost of fuel compared to Europe and the non-collection of externality costs, are often forgotten in this context. It is when the unnatural spatial dimension is added that the costs accumulates, and this makes the country especially vulnerable to rising fuel costs, environmental concerns and the high cost of road infrastructure (Figure 3).

The specific spatial challenge for South Africa is further illustrated by the fact that although South Africa contributes 0.4% of the world's GDP, more than 1.2% of the world's tonne-kilometers are required for this output. The fact that 6% of global maritime tonne-miles are generated by South Africa's ports (Chasomeris, p. 3) confirms the intrinsic and extrinsic nature of South Africa's spatial challenges even further.

In considering how this spatial challenge should be addressed various considerations is



necessary. Modal shift to road adds cost, which is the driver of the current debate when the achievement of efficiency and effectiveness is concerned. But as is often the case in this regard not all costs are considered and not all costs are accounted for, leading to imbalances in the system. Part of the problem is road

infrastructure cost accounting and the cost of externalities (Figure 4).

Road freight haulage contributes around R10.4 billion to infrastructure (fuel levy, license and toll fees) which is far too little to compensate for the usage of the infrastructure. The low concern for the infrastructure component of road costs versus rail costs is clearly evidenced by the exponential rise in South Africa's truck fleet (from 6 000 vehicles in 1938 to 270 000 in 2006). In 1990, at the point of deregulation, user-pay principles should have been installed and the railway shareholder should have invested in new intermodal capacity to equal the playing field and lower corridor transport costs to the economy. This was not done - which means that apart from the "fiscal neglect" that the Khuthele document acknowledges (Khuthele Projects, 2007, p. 8) the absence of **road** economic regulation played a part in current problems as well). The road truck fleet increased by 60% from 1990, whilst the rail wagon fleet actually declined by almost 30% (and the locomotive fleet with 17%). This was compounded by considerable aging of the rail fleet (making it less suitable for the changing market needs). This made it more or less impossible for the railway to attract or retain corridor transport and impossible for the country as a whole to exploit the density advantage of the corridors. Apart from all of this the approximately more than R30 billion of externalities that should be added to the freight bill is not yet considered.

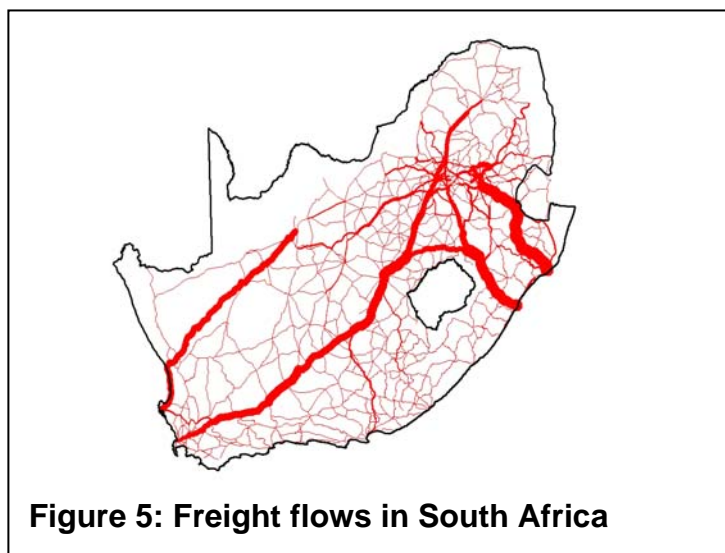


Figure 5: Freight flows in South Africa

If costs are the major problem in South Africa's domestic transport system, unnecessary wastage must be questioned. The drivers of costs should rather be identified and managed downwards in order to achieve strategic competitiveness for the country as a whole.

Costs drivers should, ideally, be considered per mode and per typology. Typology (or market segmentation) is a more fundamental approach to freight flow classification. All freight flows in South Africa is depicted in figure 5.

From these flows four typologies were derived as a first attempt to segment freight flows in South Africa (Havenga, 2007, p. 146). These are export line transport (the bulk long-haul movement of low value commodities from mines to export harbours), corridor transport (large volume transport of beneficiated and higher value products over long-distance corridors between defined metropolitan centers), rural transport (long and short haul transport of low density in rural areas and between these areas, and feeding into corridors and metropolitan areas) and metropolitan transport (high density local deliveries) (Havenga and Naude, 2006, p. 11; Havenga, 2007, p. 141-147). The most important cost driver for road is fuel and for rail is density. This relationship means that in a very low cost fuel environment, economies of scale advantages for rail would be lower (though still positive), but in a very high fuel cost environment rail's density opportunities would be invaluable to any economy.

South Africa burns around 21.5 billion liters of fuel per annum (11.5 billion liters of petrol and 10 billion liters of diesel) (SAPIA, 2008, p.17) which has an alarming effect on logistics costs in the current environment. Taking the current fuel price into account, fuel costs for a 7-axle interlink as a percentage of variable costs is 71% (or 51% of operating costs). In fact, initial calculations show that a shift of 100 billion tonne-kilometers (of the 200 billion tonne-kilometers currently on road) could save the country 1.9 billion liters of fuel if it is hauled by rail electric power. This power could be generated locally and will constitute a foreign exchange saving, but even if it were hauled by rail diesel power the saving would still be one billion liters of fuel.

As far as the network typologies are concerned a more detailed evaluation is required. Export line transport (71 billion tonne-kilometers – all on rail) is part of defined “factories” (i.e. is seen as mere conveyor belt extensions of the mines) and is already benchmarked as some of the best such systems in the world. The cost is low and it is highly unlikely that different institutional arrangements will affect costs (except to increase it). The only issue could be pricing, but the transparency required to address this issue could be solved in many straightforward and simple ways. Transnet’s approach is to create capacity, in step with mining houses’ demand patterns, to the degree that it can be afforded and based on long-term contracts. In these cases the rail system is integrated with mine production processes, harbour activities and terminals and any form of vertical separation would be counter-productive and harmful to a seamless, and integrated high performing machine.

The biggest challenge for metropolitan transport (64.5 billion tonkilometers – 2.5 on rail) is congestion alleviation, but South Africa’s freight rail system plays an insignificant role in this sphere.

Rural transport (95 billion tonkilometers – 26 rail<sup>2</sup>) requires an extensive network of low density services, in the case of branch lines, which means that the per unit cost of transport will always be high and that difficulties will be experienced to exploit density. Where Transnet provides services in this case it often refers to a “secondary network”. Due to its nature many of the arguments against vertical separation and especially open or third party access are not valid and limited institutional arrangements could be investigated. This should be done in step with a plan to develop all logistics infrastructure in rural areas in order to achieve South Africa’s development objectives.

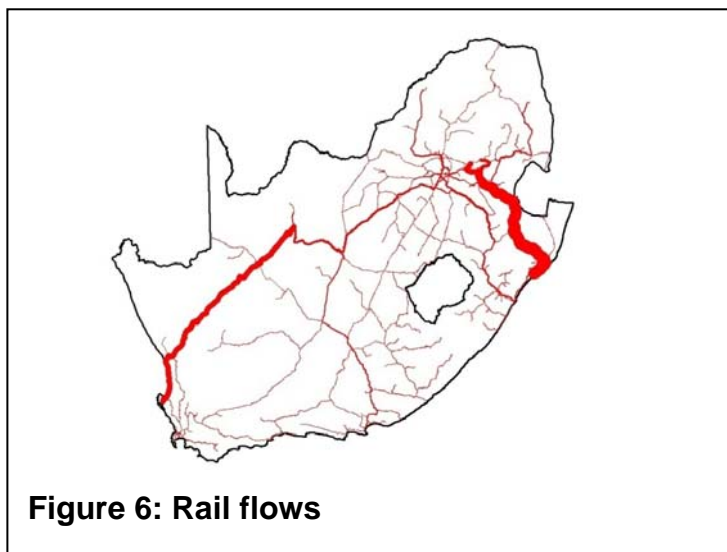
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<sup>2</sup> It should be remembered that a large portion of rail rural traffic moves through rural areas without actually serving those areas, i.e. it is mining commodities from rural areas to export harbours or manufacturing centres. Branch lines, which serve rural areas in general are only a small portion of this.

The major opportunity for costs savings to the economy through the revitalisation of the rail mode and exploiting the benefits of modal shift therefore seems to be corridor transport, as discussed in further detail below.

The 160 billion tonkilometers on our corridors (of which only 31 billion tonne-kilometers move over rail), cost the economy R117 billion rand and is transported in a highly inefficient manner. This cost constitutes almost 50 percent of South Africa's total freight transport bill. Various scenarios could be investigated and modeling approaches exist to determine the cost advantage of large scale intermodal solutions on specific corridors - initial results show clear advantages (Havenga, 2007, p. 209-216).

A modal shift to 50% for rail (from the current 14%) on the Durban corridor alone would



decrease the freight bill for the corridor by R2 billion (or 1.8% of corridor costs), whereas a shift to 80% will save R3.2 billion rand (or 2.8% of corridor costs). An 80% rail market share figure for all corridors countrywide would save R22 billion. A saving of R22 billion constitutes 12.8 % of the nation's freight bill, 6.5% of total logistics costs and 1% of GDP.

A segmentation approach would compare total freight flows in the country with all flows which is currently on rail (figure 6).

The question is then whether rail economic regulation or rail reform should consider the role of the railway as it is or as it should be? Clearly corridor traffic seems as if it should be rail bound and clearly it isn't. In a classification system, what would the determinants of successful rail traffic be and from that what theoretical model of a "virtual railway" (which should be the object of rail reform) be?

## **THE POSSIBLE ROLE OF A RAIL ECONOMIC REGULATOR**

Given the specific circumstances in South Africa the possible role of a RER is limited as far as freight railways are concerned. Primary and corridor transport should not be affected and metropolitan freight rail transport is a non-issue, which means that only rural transport over branch lines could benefit by being ringfenced and possibly restructured. If an RER is established anyway, this could be a point of departure to consider third party access (i.e. the Brussels model).

If the overarching objective of any reform and the process of regulation is increased efficiency and effectiveness, this objective should be considered for South Africa's freight system and not railways in isolation (after all only 9% of the nation's freight bill is spent on rail). It is implied that modal shift will decrease total freight costs, but one of the direct drivers is in fact the cross-subsidisation of road freight by other road users. The Khuthele document also acknowledges that conditions for various countries would differ. Given the above analysis a role for the regulator, if considered, could be the following:



## 1. Pricing:

- a. The export lines: These lines are “captured”, but systemic integration is key. The lines, together with the mines that it serve and the ports from which coal and iron ore are exported forms one systemic process or “machine” that competes with other comparative processes around the world. In fact, in some cases around the world, the lines and mines belong to a single owner. Vertical separation will drastically hamper South Africa’s competitiveness. Transnet and the mine owners should be completely transparent in this regard and a regulator could play a role in engineering, overseeing or facilitating this mutual process in both directions – in summary ensure that in terms of price neither the freight owner nor the railway is exploited (it should be remembered that just as the commodity is rail “captured” the railway is commodity “captured”).
- b. The corridor network: Everything possible to achieve modal shift should be done. As far as pricing goes the same process of transparency should be engineered between both rail and road modes and freight owners. If road transport is conducted according to the user pay principle and if the turnaround strategy for rail that is already showing results is allowed to continue, modal shift as already being demonstrated should happen. This is especially if no additional costs (such as what vertical separation would bring) is added to rail costs. Once user pay principles are installed for road and cross-subsidisation is therefore removed from road freight, a regulator could facilitate the transparency that would be required from a single vertically integrated railway, the terminal operators and the freight owners - in summary determine real costs of all modes and ensure that resultant pricing is related to this costs.
- c. Branch lines: Branch lines are clear targets for third party access as the analysis illustrates. In this case the regulator could assist with this process, but in the same manner as other property transfer processes also ensure that the economic viability of the different structures and its roles are protected. A good example is the two overarching principles of land reform, i.e. to ensure the sustained commercial viability of transferred land and the protection of our food supply. This means that the rural freight system in total should be considered and pricing could even be subsidized to meet development objectives. A regulator could assist with this process – in summary determine real requirements and ensure that pricing, including subsidies achieve the required objectives.
- d. Metropolitan: A regulator could play a role in decongestion, by promoting passenger modal shift, but also through the regulation of road freight, through congestion charges, etc. – in summary, as for the corridor network determine real costs of all modes and ensure that resultant pricing is related to this costs.

## 2. Planning:

The regulator could play a role in promoting an understanding of the symbiotic relationship between road and rail planning. Once the real potential of modal shift is understood the effect of that shift should lead to an understanding of what infrastructure would be required. The regulator could facilitate the process of ensuring that both the required rail and road infrastructure that would lead to efficiency and effectiveness (the overarching objective) is developed. A performance management system could then be considered to ensure that both the rail and road infrastructure are economically maintained and efficiently used.

South Africa's specific history and circumstances clearly indicate that the role of an economic regulator should be that of a transport economic regulator. A blind belief that competition on rail will achieve efficient and effective rail services is unproven, costly and complex. If the historic imbalances are addressed, reinvestment in rail maintained and the turnaround strategy supported, efficiency and effectiveness could be engineered in a much shorter time whilst protecting and promoting South Africa's competitiveness. A transport economic regulator could assist in this process through equalizing the playing field, engineering transparency and through performance management.

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