

OPERATING A RAILWAY SYSTEM WITHIN A CHALLENGING ENVIRONMENT: ECONOMIC HISTORY AND EXPERIENCES OF ZIMBABWE'S NATIONAL RAILWAYS

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ABSTRACT

This paper presents a historical background to the development of the railways in Zimbabwe and then discusses their current state. Besides being a landlocked country in Southern Africa, Zimbabwe has since 2000 been saddled with socio-economic and political challenges which have seen a decline in all economic indices, hence posing some challenges to its railways. This article discusses the challenges faced by the railways as a result of high inflation, unstable currency exchange rate, brain drain, poor management, government interference in management, customs border delays, and energy shortage. The problems have been addressed in unique ways and unusual solutions are proposed. These include customer financing for maintenance and spares and the resuscitation of steam locomotives. The presented solutions, lessons and issues from this experience contribute to discussions and study of railway logistics in challenging environments. Finally, current and future research issues, which have a global appeal, are presented.

INTRODUCTION AND HISTORICAL BACKGROUND

The railways in Zimbabwe are a critical transportation mode for the mining, agricultural and manufacturing industries in the country. The main mining products are coal, chromium ore, asbestos, gold, nickel, copper, iron ore, vanadium, lithium, clay, tin, platinum group metals and numerous metallic and non-metallic ores; the main agricultural products are maize, cotton, tobacco, wheat, coffee, sugar cane, peanuts, sheep, goats and pigs; and the main production industry products are steel, wood products, cement, chemicals, fertiliser, clothing and footwear, foodstuffs and beverages. In 2004, the industrial production decline rate was estimated at 7.8%. The value of exports was estimated at US\$1.409 billion, free on board with the main exports being cotton, tobacco, gold, ferroalloys and textiles/clothing. Imports were estimated at US\$1.599 billion free on board (World Fact Book, 2006). The economy declined by about 40% between 2000 and 2008 and this has severely reduced the demand for railroad transportation. Industrial production dropped by 47% and agricultural production by 51% (Wikipedia, 2008).

The railways in Zimbabwe were pioneered by the British South Africa Company, which teamed up with other limited liability companies to construct and operate the Beira Railway

Company and the Bechuanaland Railway Company Limited. It was later split into two companies and renamed the Rhodesia Railways and the Mashonaland Railway Company. In 1937, the Mashonaland Railway Company was taken over by Rhodesia Railways Limited. The new entity owned and operated most of the railways in Southern Rhodesia (now Zimbabwe), in Northern Rhodesia (now Zambia) and in the Bechuanaland Protectorate (now Botswana) except the 10 km track from Mutare to the Mozambican border, the branch track from Somabula to Shangani and a small section at the Beitbridge border post with South Africa. In 1949, the Southern Rhodesia government purchased all the shares in Rhodesia Railways Limited transforming it from a private to a public company, and renamed it Rhodesia Railways (Smith, 1987). During the Federation of Southern Rhodesia and Northern Rhodesia and Nyasaland (now Malawi), from 1953 to 1963, the administration of the railways became the responsibility of the Federal Government, with 60% owed to the Southern Rhodesian Government, 25% to the Northern Rhodesian Government and 9% to the Railway Pension Funds. When the Federation split up in 1963, and Northern Rhodesia gained independence and changed its name to Zambia and the Southern Rhodesian Government made its Unilateral Declaration of Independence (UDI) in 1965, the two governments agreed to split the railways. The Rhodesia Railways Act was established in 1972 to create Rhodesia Railways. This was further amended in 1979 in anticipation of the independence of Zimbabwe to create the National Railways of Zimbabwe (NRZ) (Smith, 1987).

Botswana Railways (BR) was created in 1986 and took over the Botswana-based railway infrastructure and operations from the National Railways of Zimbabwe on 1 January 1987. BR's system maintains 888 km of 1.067 m narrow gauge track that runs essentially along its south-east section connecting the border of Botswana and Zimbabwe through Francistown and Gaborone to the border of Botswana with South Africa. The opening of the Beitbridge Bulawayo Railway (BBR) in Zimbabwe in 1999 resulted in a major drop in the volume of freight transit and income for Botswana Railways, since the link to South African ports was shortened by this new entity. This new railway will become a part of NRZ in 2029. As a response the BR has been considering the construction of a direct line to Zambia, bypassing Zimbabwe, to regain income from transit freight from Zambia and Zaire (Botswana Railways, 2006).

Methodology

The research method mainly involved a critical assessment and review of existing literature, discussions and interviews with officials of the National Railways of Zimbabwe and of the Southern African Railways Association (SARA). Most data and information was collected from publications of the Zimbabwe Central Statistical Office, the internet, consultancy reports and research on the railways in Zimbabwe, and the findings of the Justice Smith Commission of Inquiry into the operations of the parastatals in Zimbabwe. Data collection was a challenge since the government of Zimbabwe decided to classify economic information and data from the National Railways of Zimbabwe, the Central Statistical Office and other government-

owned enterprises to mask the failure of its policies. The last compendium of statistics was produced in 2001. Other minor statistical publications are only available up to 2004. The National Railways no longer publishes an annual report nor does it report annually to Parliament as was previously the case. This lack of data and information posed major challenges for the study. However enough information was obtained to enable informed assessment and identify major challenges in railway operations. Based on the challenges of the operations that were identified, strategies to address them were identified and discussed and some conclusions made. The work indicates learning points and lessons for railway operations in difficult environments and proposes further areas of inquiry.

RAILWAY TRANSPORTATION IN ZIMBABWE AND ITS CHALLENGES

The National Railways of Zimbabwe has connections with the South African Railways at Beitbridge, with the Botswana Railways at Plumtree, with the Zambian Railways and eventually with the Democratic Republic of Congo through Victoria Falls. There are also links with Mozambique Railways through Machipanda and Chicualacuala. It is linked with members of the Southern African Railways Association (SARA, 2007) as shown in Figure 1.

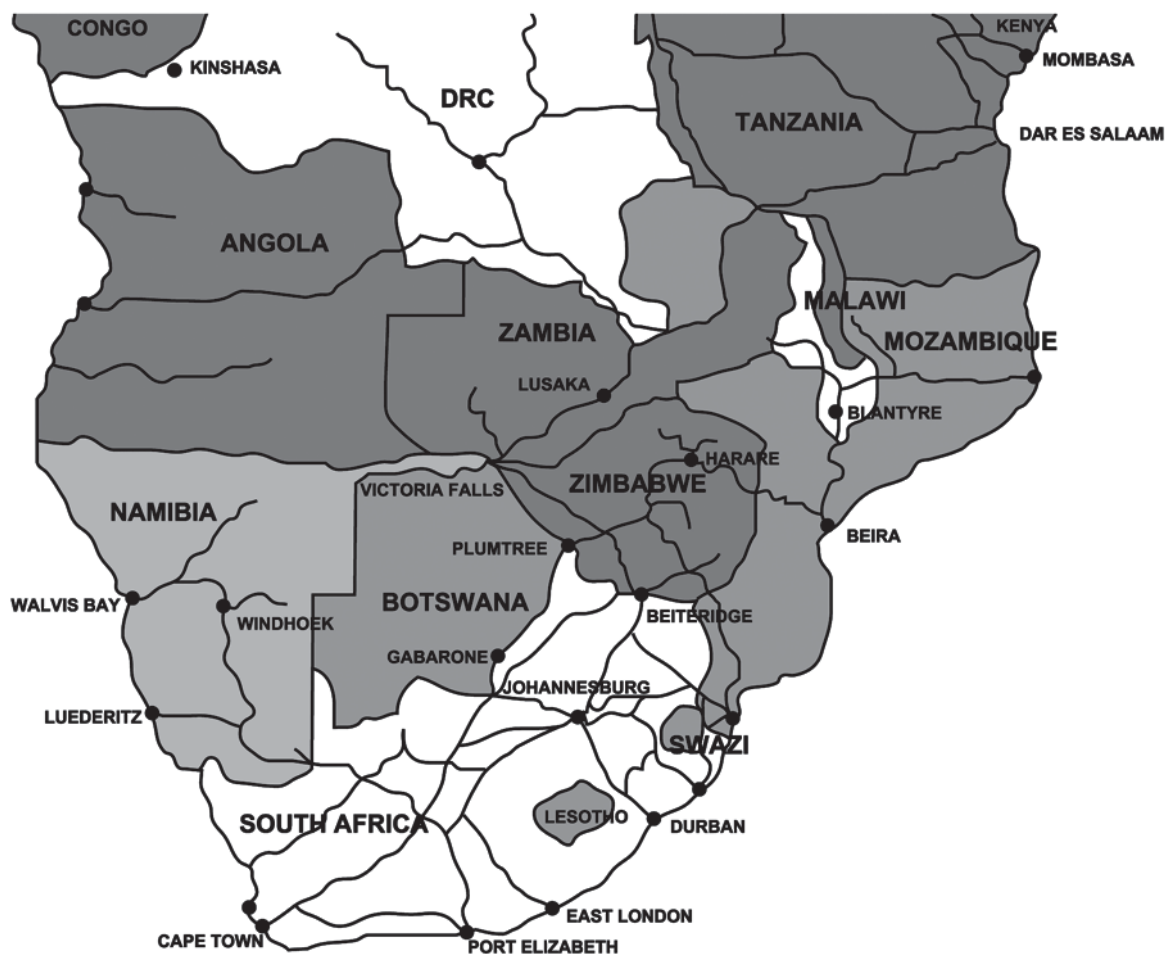


Figure 1: Railway Network of the Southern African Railways Association (Source SARA, 2008)

The railway line in Zimbabwe covers a total length of 3 077 km, 1.067-metre gauge, of which 313 km is electrified using a 25 kilovolts overhead system. This competes mainly with the roads and highways which have a length of 18 338 km with about 8 692 km of them paved. The other competition comes from the 261 km pipeline, which transports refined products from the eastern border city of Mutare to Harare. Air transportation is limited even though there are 17 airports with paved runways varying in length from 914 to 3 047 m (World Fact Book, 2006). The main railway lines are laid with 45 kg/m or 54 kg/m rail continuously welded and mostly signalled by centralised control systems. Branch lines are built with 30 kg/m or 40 kg/m rail and are signalled by paper order working assisted by facsimile machines. All but 28 km of rail route in Zimbabwe is single track with passing loops at an average of 9 km apart (SWEKO, 1985). This is adequate as long as signalling equipment and track is well maintained. Recent spares shortage due to lack of foreign currency have resulted in derailments and head-on collisions. The total fleet in 1985 was made up of 30 electric locomotives, 87 steam locomotives and over 300 diesel locomotives of all types (SWEKO, 1985). Since then, steam locomotives were scrapped and a few of them are being resuscitated to overcome diesel shortage, operate steam safari trains and do the shunting operations in the Bulawayo area. While reviving steam locomotives has improved NRZ operations, it is not good or appropriate as a long-term strategy, because most steam locomotives are life-expired, and hence too costly to run.

Historical NRZ operational performance

The details of traffic carried from 1970 to 2002 are shown in Table 1 (CSO, 2001; CSO, 2004).

The net tonne-kilometres moved have dropped substantially, with the value for 2001 being 50% of that in 1985. This was clearly a reflection of reduced commercial farming agricultural output, which dropped by about 50% when compared to the year 2000 as a result of disruptions on commercial farms. This also reflected the effects of the chaos that characterised the elections in 2000, since most output declines resulting from the disturbances were registered a year later. The drop also showed a continuing change of the nature of railway transportation business, having more internal traffic within Zimbabwe, less import/export traffic and less transit volumes to and from neighbouring countries moving through rail, resulting in less train distances and less tonne-kilometres. The number of passengers transported declined by 14.9% from 1999 to 2000 and the net tonne-kilometres by 24.1% during the same period, reflecting the immediate chaos during the 2000 parliamentary elections. The increase in number of passengers in 2002 is artificial, since commuter trains were introduced in Harare for short hauls to a number of high density suburbs. Previous data was for long distance travel only.

Table 1: Railways traffic volumes and financial performance (CSO, 2001; CSO, 2004)

Year ending June	Operating surplus (deficit) in thousands	Net surplus (deficit) in thousands	Number of passengers (thousand)	Revenue earning tonnes (thousand)	Gross tonne-kilometres (million)	Net tonne-kilometres (million)
1970	19 632	1 678	2 814	10 846	14 411	6 500
1971	17 380	(1 676)	2 782	10 768	14 283	6 293
1972	19 152	(1 926)	3 013	11 498	15 308	6 802
1973	12 255	(10 996)	3 236	11 598	15 194	6 623
1974	6 339	(19 139)	3 010	11 801	14 600	6 190
1975	8 483	(21 226)	3 127	12 018	14 686	6 141
1976	6 018	(29 119)	3 105	12 845	14 845	6 358
1977	1 102	(36 912)	2 613	12 108	13 957	6 104
1978	550	(35 697)	2 227	11 191	12 792	5 588
1979	13 441	(28 965)	1 574	11 621	13 391	6 149
1980	13 114	(32 151)	991	12 687	14 167	6 864
1981	20 277	(32 681)	1 580	13 153	13 540	6 610
1982	19 431	(39 730)	1 825	12 703	12 951	6 259
1983	21 793	(50 887)	2 050	13 071	13 008	6 289
1984	37 222	(45 976)	2 218	13 428	13 206	6 411
1985	37 339	(67 796)	2 471	13 088	13 029	6 200
1986	36 282	(87 389)	2 713	13 619	13 711	6 574
1987	7 520	(131 945)	2 650	13 200	11 239	5 451
1988	16 101	(116 666)	2 740	13 222	11 471	5 551
1989	6 217	(116 686)	3 126	13 215	10 592	5 287
1990	(36 427)	(227 913)	2 862	13 888	11 045	5 590
1991	163 834	515 158	1 975	12 928	10 930	5 413
1992	304 886	58 057	2 355	13 038	11 913	5 887
1993	228 648	(130 915)	2 200	10 464	9 649	4 581
1994	230 585	(161 658)	2 034	11 250	9 397	4 489
1995	335 740	(55 961)	1 670	18 448	13 440	7 180
1996	472 163	180 946	1 651	11 878	10 099	4 990
1997	467 580	(69 883)	1 461	10 163	9 989	4 100
1998	561 334	(71 522)	1 787	12 421	9 244	4 546
1999	1 263 080	153 501	1 896	11 028	8 962	4 381
2000	1 789 916	(351 369)	1 614	9 422	6 953	3 326
2001	346 655	(2 151 912)	1 334	8 843	6 667	3 100
2002	1 478 798	4 143 902	2 315	11 154	8 588	4 086

The political and economic situation and its impact on locomotives, wagons and coaches

The political and economic situation between 2000 and 2007 has been characterised by an unsustainable fiscal deficit, an overvalued and unstable exchange rate, soaring inflation, which was 7 635% in July 2007 (Reuters, 2007) and shortage of foreign currency to buy critical requirements like electricity, fuel and industrial inputs. Badly needed support from the IMF was suspended because of the country's failure to meet budgetary goals, and inflation rose from an annual rate of 32% in 1998 to 133% at the end of 2004, to more than 600% in November 2003, down to about 130% in early 2005 and up to more than 1 200% in the middle of 2006. Inflation is now estimated at 2 000 000%, a situation of hyperinflation (Wikipedia, 2008). The exchange rate fell from Z\$24 per US\$ in 1998 to Z\$6 200 at the end of 2004 to Z\$1 500 000 (\$1 500 revalued) in October 2006 and about Z\$500 000 as at 9 October 2007. The Zimbabwe Reserve Bank trimmed three zeros from the currency on 1 August 2006, introducing new bearer cheques. In July 2008 the exchange rate had tumbled to close to Z\$700 billion (700 trillion old Zimbabwean dollars before revaluation) for every US dollar.

The land reform programme, which was violent and chaotic, damaged the commercial farming sector – the traditional source of exports and foreign exchange and the provider of 400 000 jobs and the volumes that used to be transported throughout the railway and other transportation systems. A shortage of agricultural inputs to agricultural processing industries affected the manufacturing sector and related finished product exports. The Gross Domestic Product (GDP) was estimated at US\$24.37 billion in 2004 at an economic decline rate of 8.2%, compared to the previous year. The GDP was roughly split among sectors as follows: agriculture (8.1%), industry (24.3%) and services (57.7%) (World Fact Book, 2006). Traditionally agriculture used to contribute 15% to 18% of the GDP directly. It also contributed to the GDP indirectly through agro-processing, transportation and service industries like restaurants.

The difficult political and economic environment in Zimbabwe has resulted in serious technical, operational and financial problems for the NRZ affecting its role as a critical provider of logistics services. The tonnages moved by NRZ declined from 12.4 million tonnes in 1998 to 5.8 million tonnes in 2003. This was as a result of the chaotic presidential elections in 2002. The drop in traffic volumes also tended to correlate with the drop in the number of mainline locomotives available for use. Locomotive availability in the NRZ generally has been greatly hampered by the loss of qualified and experienced manpower, lack of electricity and diesel and by lack of foreign currency to procure spares. In this period, mainline locomotive availability fell from 52% in 1999 to 26% in 2003. The operating profit of NRZ declined from 35% of total revenue in 1999 to a deficit of 5% of the revenue in 2001. The operating profit was 15% of operating revenue in 2002 and went up to 42.5% of operating revenue in 2003. However this was due to under-expenditure on maintenance

as a result of the failure to secure foreign currency to import spare parts, overcharging captive customers and the fact that the accounts were not inflation-adjusted. For example in June 2004, only 21 of the 56 serviceable locomotives were rail-worthy. This reduced the reliability of the locomotives and hence of the trains. Of the 175 locomotives available in January 2006, 118 were overdue for service (Sandu, 2006).

Most of the locomotives used are life-expired and the replacement costs of the General Motors-supplied DE10 class of diesel-electric locomotives and newer generation General Motors diesel-electric DE11 locomotives are estimated at US\$2 million and US\$2.5 million respectively (Sandu, 2006). This is impossible given the current shortage of foreign currency. The situation has been worsened by the fact that during the UDI period from 1965 up to 1980 world sanctions were in place. As a result the diesel locomotive fleet consists of locomotives from General Motors and General Electric in the USA, Germany, France and the United Kingdom procured through sanctions-busting techniques that limited choice on the type of locomotive procured. Currently through the "Look East Policy" there is an idea to import locomotives from China. In an interview with one of the NRZ engineers, it was noted that spares to ensure that the required number of locomotives are made available would cost, in US dollar terms, 10% of the cost of buying new locomotives from China (Sandu, 2006). In addition procuring these spares as opposed to buying new types of locomotives from China would reduce maintenance costs, spares variety and the volume of spares. (Sandu, 2006)

The rolling stock fleet has also been adversely affected. About 44% of the wagon fleet was found to be life-expired in a survey carried out in June 2003. The service life of a wagon is 30 years. Since this survey, there has been no procurement of new wagons implying that the percentage of expired wagons has gone up (Sandu, 2006). During that survey, it was found that a total of 2 744 wagons from a fleet of 10 713 were out of service. From a fleet size of 6 837 of the high-sided iron wagons, 1 823 were out of service. Out of a fleet of 1 891 drop-sided iron wagons, 386 were out of service. Of 703 tanks, 431 were available. There were 63 container wagons out of service from a fleet of 450 while of the 832 covered wagons, 200 were out of service. With a replacement value for each wagon billed at US\$75 000, replacement of all life expired wagons numbering at least 4 500 is impossible given the state of the economy. On the other hand many wagons are parked awaiting spares and could be refurbished to extend their life span if the government availed the required foreign currency.

The passenger carrying coaches have not fared better. Out of a fleet of 314 coaches, 304 were overdue for service as at 14 June 2004 (Sandu, 2006). The technical condition of the oldest fleet of coaches used for the commuter service and for some of the inter-city routes was classified as "particularly bad". Many of them did not have any lighting inside due to

obsolete components and some had worn out floors and vandalised doors posing serious safety risks, among many other defects (Sandu, 2006).

Brain drain from the NRZ

Staff turnover at the NRZ has been very high. In the four years to 2003, it lost over 200 (10%) skilled personnel to other countries. Staff lost comprised engineers, technicians, computer programmers and artisans, most of whom joined the privatised and numerous railway systems in the United Kingdom. This has been compounded by low complements through natural attrition and the Aids pandemic, negatively affecting production and productivity (Sandu, 2006).

Poor management and inappropriate government interference

The National Railways of Zimbabwe Act has provisions which empower the Minister responsible for transport to appoint the NRZ Board to which the General Manager reports. It also provides that the government of Zimbabwe shall cover any deficit incurred by the NRZ. The tariff structure is controlled by the Minister and is based on political rather than commercial or economic objectives. It does not relate to costs and this has made it very difficult for NRZ management to make strategic investment decisions. As political control has tightened in the NRZ it is no longer free to take management actions without government approval. This is worsened by the fact that the Zimbabwean government no longer has the financial resources to compensate the NRZ for losses incurred due to being forced to operate loss-making services. This is despite the provisions in the NRZ Act for compensation for such services. For example, since 2000, the government of Zimbabwe has forced NRZ to provide low-cost commuter services in Harare and Bulawayo, plunging it into cash-flow problems that resulted from having a marginal revenue increase of 375% in 2004 against expenditure increases of 1 017% (Makoshori, 2006).

Poor management of the railways over decades has resulted in high inefficiency and poor rail infrastructure and many customers have switched to road trucks as a more efficient and reliable mode of transport. However they pay a heavy penalty since the cost of trucking is 28% more than rail pushing logistics costs up (Phasiwe, 2006). According to a World Bank report titled "Zimbabwe Infrastructure Assessment: Note for Roads, Railways, and Water Sectors", the NRZ suffered an 8 million-tonne slide in freight traffic between 1990 and 2005 due to poor management and government interference in its operations. In 1990, NRZ's freight traffic was about 14 million tonnes but it reduced to about 6 million tonnes per year during the years 2003, 2004 and 2005 hence precipitating massive losses in revenue. The losses were attributed to low revenue due to capacity constraints, a rigid and inefficient tariff structure, excess staff levels and poor utilisation of assets, which mostly reflected on poor NRZ management and the impact of government control on business decisions and tariffs (Makoshori, 2006).

A strategy for control by the Government of Zimbabwe has involved using security agents, mainly soldiers and police, to man publicly owned enterprises. These personnel have contributed to the high rate of train accidents in the NRZ according to investigations carried out by a government committee in October 2006 (ZimOnline, 2006). This was after a head-on collision between a goods and passenger train near the northern town of Hwange in August 2006 that left 60 people dead. The collision, which was the second such accident along the same railway line in less than three months, left eight people dead and scores of others seriously injured. On 1 February 2003, 40 people died at the Dete train crash (Wikipedia, 2008). The accidents were mainly caused by life-expired equipment and poor communication and signalling systems due to lack of foreign currency to procure spares and replace parts of the system. In such situations, paper-order or manual systems can be used effectively by qualified personnel. However the security agents manning the system lacked the qualifications, knowledge and experience to run the restored paper-order system. Many of them had attended short crash courses, which are inadequate for effective management of such critical functions. Minor technical faults that have been reported within the NRZ have gone for long periods without being repaired, most of the time due to lack of knowledge by the staff responsible. These problems have resulted in accidents, which have in turn scared away passengers and clients (ZimOnline, 2006).

Customs border delays

It has been estimated that bottlenecks and delays at southern African border posts cost the region US\$48 billion a year, mainly due to cumbersome inspection regimens by customs officials on goods transported across borders. These also have a very negative effect on turnaround times of transport and logistics service providers, with trains and trucks delaying ships, hence failing to deliver goods on time. The transport providers are forced to pay huge penalties for failing to meet service obligations to their clients. Zimbabwean border control systems have been particularly bad and delays at the Beitbridge customs and immigrations border post, the gateway between SA and neighbouring Zimbabwe, can last up to 12 days due to customs clearance procedures. Thieves often take advantage of the unguarded stationary trains and pilfer the cargo (Phasiwe, 2006).

Energy problems

The NRZ has been faced with crippling petroleum products shortages since 2001 resulting in train cancellations. Zimbabwe's total petroleum fuel requirements are about 100 million litres per month at a total cost of at least US\$40 million per month at 2007 prices. However estimates of actual fuel available are put at 30% of total requirements/demand. A government-owned company, National Oil Company of Zimbabwe (NOCZIM) has a monopoly in the procurement and shipping of fuel and provides petroleum products to the government, parastatals, private oil companies, farmers and registered public transporters. Even though NRZ earns foreign currency, it has not been allowed to use a part of its earnings to directly

import diesel, even though oil companies like Caltex have fuel importing methods for customers that need at least 2 500 litres of fuel for foreign currency holders.

Coal supplies for use to power steam locomotives have been erratic too, delaying shunting operations in the Bulawayo area. This has been mainly due to Hwange Colliery Company's inability to meet the customers' demand for coal and the lack of spares for mining equipment. Electricity supply during the winter seasons has been intermittent due to load shedding, blackouts and breakdowns. The average output of the Zimbabwe Electricity Supply Authority national grid is 1 650 MW against a peak demand of 2 100 MW (ZESA, 2005). In many cases, electricity imports could not be made due to lack of foreign currency and the resulting failure to settle import bills. Power cuts were therefore introduced to maintain system stability. This meant that in some cases, electrically driven locomotives were stuck for the duration of the power cut, which varied from a few minutes to as long as six hours.

STRATEGIES FOR THE NRZ TO ADDRESS THE CHALLENGES

The NRZ and its customers have devised a number of unusual survival strategies to overcome some of the negative impacts of the difficult political and economic environment in Zimbabwe. Some of these have involved innovative fire-fighting approaches. For example South African Railways have lent locomotives to NRZ and in many cases turnaround times for wagons from South Africa, Zambia, Botswana and Mozambique have been extended in the Zimbabwean systems for internal use. Railway systems cannot control this practice and all they do is to charge demurrage. It also disturbs the internal operations and plans for the countries that have temporary loss of the rolling stock. This is further worsened when demurrage is not paid due to lack of foreign currency. This section examines more strategies used and proceeds to suggest other ways of arresting the decline of the railway industry in Zimbabwe.

Access financing from customers and from government

As part of its recapitalisation, the NRZ sought and received Central Bank authority to obtain funding from key customers. This was granted and recapitalisation started in July 2003 to restore capacity in terms of locomotives, wagons, coaches and infrastructure. The company and its major customers agreed to set aside US\$23.4 million, from foreign currency retention schemes of the customers, over a five-year period for the repair of 45 locomotives. This was initiated by the Confederation of Zimbabwe Industries, the Zimbabwe National Chamber of Commerce and by individual companies that cannot survive without the railways, in direct meetings with the NRZ. The major customers that contributed include logistics companies Stuttafords, Glens and Inter Trans Mover, the Zimbabwe Power Company (ZPC), which transports coal for power stations, Zimbabwe Sugar Sales (ZSS), Ziscosteel and New

Limpopo Projects Investment. However due to further challenges in the economy, progress was very slow and only 13 locomotives from a pool of 45 had undergone refurbishment and repairs by January 2006 two-and-a-half years later. This was a simple way of bypassing the Reserve Bank of Zimbabwe command and control by indirectly paying for freight in US dollars. The depressed volumes and capacity naturally slowed progress since payment was based on transportation done. This was a condition put forward to ensure that the NRZ customers were not prejudiced. The formal contracts already in place were used, with a change to indicate that payment could be done in US dollars and could be made in the form of paying the NRZ supplies for spares to be delivered.

NRZ also benefited from its major customers for the repair of wagons. NRZ's major customers – Bindura Nickel Corporation, ZIMASCO, Triangle and Hippo, ZPC and ZSS – also financed the repair of wagons to the amount of US\$2.4 million, enabling the acquisition of the necessary imported components for the efficient and safe operation of the trains. This programme was more successful and by January 2006, only 81 wagons had not passed through the repair stage from a target fleet of 829. This was a case of the companies that traditionally use dedicated wagons paying for the transportation services of the NRZ in the form of spares for their fleets using the foreign currency that they are allowed to retain. Again this strategy involved by-passing the unnecessarily tight controls imposed by the government of Zimbabwe.

On the political front, the railways managed to negotiate to have its status regarded as being of extreme priority. NRZ was thus placed among parastatals and local authorities set to benefit from the Z\$3 trillion (US\$30 million) Parastatals and Local Authorities' Re-orientation Programme (PLARP), supervised and vetted by the Reserve Bank of Zimbabwe and providing funds for productive purposes. The constantly weakening currency, ministerial and government interference and the fast turnover of the management board and general managers have however reduced the positive impacts of these efforts (Sandu, 2006).

Capitalisation to increase market share

The National Railways of Zimbabwe has lost a large share of its market to the trucking and bus industry. While no data could be found on the traffic volumes moved by road, the number of vehicles that weigh more than 2.3 tonnes increased from 34 485 vehicles in December 1994 to 71 116 vehicles in December 2001. This suggests a growing demand for road transportation. Strategies need to be put in place to create the right conditions that will ensure the sustainable growth of the railway market share and compete effectively with growth in the road transportation sector. The economic decline has shrunk traffic volumes resulting in reduced number of locomotives, wagons, coaches and trains in operation. Recovery against the road sector will require large amounts capital investment to acquire new locomotives and rolling stock, and to upgrade rail infrastructure, particularly the purchase of new signalling equipment and technology. Such investment would have to be sustained for

a period of five to ten years depending on the availability of finances and foreign currency (Phasiwe, 2006). This capital investment would need to be accompanied by the creation of better planned city commuter trains for Bulawayo and Harare. The revival of the Road Motor Services, a railway-owned company that assisted to ensure a coordinated rail supply chain from receiving to delivery, would help to attract customers. Better signalling, operations and maintenance would ensure that passenger trains improve on timeliness and not arrive up to 12 hours late. Operational improvements like providing bedding, which was stopped, would also improve passenger convenience and comfort and attract back some of the long-distance passengers.

Removal of border controls to reduce traffic delays

In order to reduce customs and border delays, a suggested solution is to have borderless communities within the Southern African Development Community (SADC) countries in line with the European Union open borders systems. There would be challenges related to collection of import duties and smuggling. However the use of electronic systems, unitisation of train loads for each country and use of on-the-train inspectors could overcome some of the problems. In addition the creation of a single inspection standard for freight trains to reduce congestion at the border posts could also be considered to ensure that trains run according to schedule. This would remove the need for trains to undergo many inspection systems and protocols at the different borders of the neighbouring countries. Joint audits could be done as necessary. An additional possible solution may be to expand capacity and have more rail links or two-way systems between countries to improve train average speeds and reduce freight delays. This would simplify signalling and would reduce transit times of trains. The double lines would offer opportunities for optimisation of freight movement in both directions (Phasiwe, 2006).

Institution of management excellence

Good management can reduce rail inefficiencies and reduce railway transportation costs. A survey conducted by the United Nations Conference on Trade and Development in 2001 found that the average cost of using the railways in landlocked African countries is 20% higher than in other developing countries. This implies that efficient and cost-effective railway operations in Africa can achieve big savings. The failure to run railways properly has also adversely affected roads. The condition of road networks in Zimbabwe has deteriorated mainly due to the migration to road-unfriendly traffic because of the absence of reliable rail networks and the uncontrolled access of heavy vehicles to roads designed for lighter loads. The railways can take advantage of their capability to transport large quantities of goods, and reposition themselves to be the transport mode of choice for imports and exports in Zimbabwe and in southern Africa (Phasiwe, 2006).

The quality of human resources and skills available to the railways should be improved. The NRZ dismissed and sent on early retirement people with various types of expertise that

are now in short supply. Some of these were dismissed over labour disputes. Any available relevant and suitable skills should be hired and former employees should be re-hired to restore the organisation as a reliable and safe means of transport (ZimOnline, 2006). In this respect the use of security agents as employees and the control of daily operations by the government have to be avoided. Programmes to upgrade and maintain the dilapidated rail infrastructure in Zimbabwe should also be put in place.

DISCUSSION

A number of issues can be deduced from this study. The main lessons from the chaotic situation in Zimbabwe are:

- Economic chaos and poor policies in one sector of the economy, in this case agriculture, can severely affect other sectors like manufacturing and transportation in a multi-effect, chain reaction way.
- A poor political climate can have immediate impacts on the economy and the results of it downstream in other sectors can lag by up to one year. This was the case for rail transportation volumes after the 2000, 2002 and 2005 elections in Zimbabwe.
- There is a chance that the brain drain that occurred in the NRZ could transform into a brain gain since hundreds of former employees are working in more advanced railway systems in the UK, South Africa and Australia. The brain gain would be substantial even if less than 10% of these employees returned to the company.
- The impacts of excessive government interference in the management of railways go beyond poor business performance to death of passengers and destruction of goods during accidents resulting in migration of traffic to road.
- When given the chance, a few professional managers can provide some limited solutions, even in a harsh operation environment. The NRZ remains operational due to management/private sector initiatives and implementations.
- Financing of railways is better done by the resourcefulness of its management and by government. Customer-based financing is naturally self-serving, limited and comes in trickles in response to the disabled function of the railway system. Customer support for wagons is better than that for coaches and locomotives because wagons can be dedicated to a customer. Customers can also own the wagons and contract their operations to the railways.
- While rail-to-road migration was worst in the case of Zimbabwe, it remains a global problem that requires the creation of innovative supply chains to reduce it.

When the political and economic situation stabilises in Zimbabwe, the fortunes of the railways would be underpinned by a recovery in the agricultural sector. A critical issue would be to ensure that adequate electricity and diesel is made available to the NRZ.

Border control systems would need to be standardised so that the lead times are reduced and freight lost to road recaptured. Unitisation of loads and revivals of the Road Motor Services would integrate the rail-road supply chain to the same effect. Any future recovery plan would need to streamline the variety of diesel locomotives to at most three types of locomotives to reduce spares inventory variety, complexity of technical and maintenance operations and to improve availability. These would be one type of electric locomotive and two types of diesel locomotives.

CONCLUSION, FUTURE ISSUES AND PROSPECTS

Despite the rapid decline of the economy in Zimbabwe, there has been some transportation demand due to the movement of drought and food relief goods, mainly in the form of inbound traffic from organisations like the World Food Programme and the Government's grain import programmes. The NRZ projected that it would move 9 million tonnes of cargo in 2007/2008 despite all the problems that it was facing. However to achieve increased margins, radical reforms and prudent policies are needed (Makoshori, 2006). The recovery of the NRZ will require changes in the economic and political fields. The railway system has been stifled as a regional hub for neighbours but it still has very high potential. The region has groupings like the Common Market for East and Southern Africa (COMESA) consisting of 20 African countries and a population close to 380 million, and the Southern African Development Community (SADC) comprising 14 countries and a population of more than 250 million people. All these countries would be linked to the most industrialised centres in South Africa through the logistics infrastructure in Zimbabwe.

Improved railway operations in Zimbabwe can recapture passenger traffic and can also benefit from the recovery of the tourism sector. Although it was projected that up to 5 million tourists would be visiting Zimbabwe per year by the year 2005, only 1.4 million visited (World Fact Book, 2006). The great Zimbabwean attractions, Victoria Falls, Great Zimbabwe and the Zimbabwe national parks, are bound to attract more visitors in future. The running of steam safari trains and the development of railway infrastructure to improve efficiency and safety is bound to attract such visitors to use the railways. The challenges that the NRZ has faced have prompted the adoption of new strategies in the process of ensuring that the company does not collapse. Normal logistics and industrial engineering solutions applicable elsewhere cannot be readily applied in such an environment. The strategies adopted by the company and suggested in this paper provide lessons and ideas on railway logistics under abnormal conditions.

The future research issues concerning the railway operations in Zimbabwe are identified as follows:

- Investigating the impacts on the manufacturing industry of foreign currency, spare parts and fuel shortages, and power outages on railway lead-times and service levels
- Investigating the impact of railway constraints on Zimbabwe's manufacturing sector
- Developing methods and plans of railway logistics infrastructure/operations recovery in Zimbabwe
- Sustainability (environmental, economic and/or social) impacts of different transportation modes (railway and road transportation) including identification of freight energy-efficiency improvement methods
- Minimisation of maintenance costs at targeted service levels, which may involve the introduction of condition monitoring maintenance and technology.

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