

Evaluating Operational Efficiency of Rail Freight Volumes

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Abstract— South African roads are congested with trucks on every highway in the country leading to traffic congestion, damaged roads and pollution. Railway transportation can assist in eliminating or reducing these problems occurring on our roads. Rail traffic is decreasing because of the operational inefficiencies and this make customers unhappy and taking their business to road transportation. This paper is about how freight volumes are lost from rail to road organizations. This was conducted by looking at the operational inefficiencies experienced at both rail and road organizations. Any organization has its own plan or strategy on how to satisfy the customer and reach its target, but it is the service that they render to their customers that will determine if the organization will reach its target and at the same time satisfy the customer.

Keywords— Operational Efficiency, and Freight Volumes

I. INTRODUCTION

IN the 1930s, it was reported that rail industries started losing customers to the rapid developing road transport industry, hence the government intervened by introducing the motor carrier transportation Act (Act 39 of 1930), which was very controversial [1]. This approach was to keep the rail transportation system to be relevant and be the leading transportation system over the road transport system until deregulation of the transport industry began in the mid-1980s.

In addition, Van der Mescht [1] published a journal article on transportation, which reveal that the debate on road transportation against rail transportation reached its peak in South Africa immediately after the full deregulation of the transport industry in 1990. However, in 2000, the issues around the debate become not interesting to stakeholders in the transportation industry again because of the extraordinary growth recorded in the road transport industry [2]. Following all these, there is at present renewed interest in railways as a means of transportation, primarily because there is a change in the priority of the government, which was to be committed to improving the country's broken-down rail infrastructure of over 5 years.

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Transnet Freight Rail (TFR) is ranked the largest group among Transnet's group of companies with about 28000 employees located across the country. The business empire of TFR in heavy haulage freight rail further opens other opportunities and specialization in freight transportation system, maintenance of widespread rail network of network across South Africa, which further connect to other rail systems in the sub-Saharan region of Africa and beyond, with its railway infrastructure representing about 80% of Africa in total [3]. TFR has positioned itself to become profitable and sustainable freight railways multinational company, promoting competitiveness within south African economy and also currently championing technological leadership across the continent of Africa and beyond with operations in seventeen countries. With the aim of actualizing the strategic positioning in the African market, the company organization structure has the following six (6) business units; this includes the agriculture and bulk liquids, coal business, the container and automotive, the Iron ore and manganese, the mineral mining and chrome, the steel and cement business unit [4] - [6].

II. MOTIVATION/PROBLEM STATEMENT

It is important to highlight that the department of transport has the prerogative of regulating the road and railways transportation system. This can be exercised through the ownership of the rail system and control of the legislation of the road transportation system and regulation of road haulage [7]. Havenga et al., [8] further reported that the South Africa transportation costs is about 50% of the country's total logistics expenditure but on the contrary Rodrique et al., [9] found in his study that this is significantly higher percentage when compared to the world average (39%). Surprisingly customers have been willing to pay more by using road transport in order to receive their goods on time. However, from a macroeconomic perspective, road freight transportation has got poor effect on the environment. The study of Havenga et al. [8] revealed that the externality for South Africa includes emissions, congestion, accidents, and noise. This is also estimated to be R34 billion in comparison to the freight bill of R171 billion.

Rail freight transportation is an extremely capital-intensive business venture with a high percentage of fixed total costs. The declining tonnages transported have not only resulted in a loss of revenue but also implies that assets are not being optimally utilized [6].

Transnet's operational inefficiencies are causing customer's to move their business to road transportation. To alleviate all

the road congestion, rail organization must get the real problem or the cause of the problems they experiencing before working on a solution. An outcome from the results shows that most employees from the rail organizations do not agree with the role of performance and quality management in the organizations, this can be as a result of lack of interest or lack of knowledge. From the results, the following can be asked:

- a) Is Transnet getting all their employees to attend training programmes?
- b) Can customers trust the rail organization again and move their business back to railway transportation?
- c) What is the impact that the rail organization system has on their employees especially those at junior levels?

III. LITERATURE REVIEW

Past reports and publications has shown the rivalry between the road and rail transportation system for the conveyance of general freight has been limited to the main transport players and the rural parts of the country. It as further indicated that road and rail transportation system mostly contend in the area of the freight transport market [10]. Similarly, rail transportation poor record of service delivery was reported by the press [1], which was a result of the frustration experienced by railway customers' that were not happy. One of such was reported in the year 2004 where numerous of the railways utility major customers threatened to return to using road transportation system if the railway utility did not improve its service levels [1].

According to Beck [11], railway efficiency has been a general discussion of market competitiveness, which has been great concern among all stakeholders in transportation industry. Instead, everyone believed that it is the responsibility of the railways to ensure that the cost is low because of the influence of the market and the lack of fund due to other priorities. However, additional investment into development of track infrastructures became necessary when the demand for passage railways increases. Sanchez [12] study shows that both government and stakeholder are not only exploring ways to expand the capacity of railway system, but also reduce the cost at the same time the service of rail transportation system and improve the efficiency of rail transportation system.

In recent years, the financial and economic performance of the railway system has attracted a great deal of attention primarily because of mounting subsidies and inefficiencies imbedded in the system. The economic efficiency of railways is believed to be influenced heavily by the degree of government intervention and subsidization (taxation), and the institutional and regulatory setting within which the railways operate. The productive efficiency measured from observable data is also heavily influenced by the market and operating environments to which the railways are subjected. These include factors largely beyond managerial control such as topography and climate of the region, the extent of development of other transport modes, traffic density, average load, and average distance of haul as well as the economic development stage of the nation [5], [13]

Chinese railway has increasingly attracted global attention because it creates a miracle by running a quarter of the world's railway traffic with only 6% of the world's railway mileage. However, Chinese railway system is still very difficult to satisfy the enormous social demand derived from the rapid economic development. Under the background of globalization, insufficient railway transport capacity is becoming a key obstacle to Chinese economic development. A well-known reason for insufficient railway transport capacity is the low railway density which needs huge investment to improve. In 2008, the Chinese railway mileage on per square kilometers was 83.1 km, accounting for only 9% of the German railway density [14].

In order to improve railway transport productivity effectively, Chinese railway management mechanism achieved an historical breakthrough in 2005 with the repeal of all railway branches; the four-level management system constituted by the ministry of railways, railway bureaus, railway branches and railway sections was abandoned [15].

It was noted that train lengthening has been identified as one potential way in which growth can be accommodated and indeed, features as the most important capacity enhancing measure for container trains recommended in the Rail Freight Route Utilisation Strategy (RUS) [16], [17]. It argues that an increase in train length from the typical 24 wagons at present to 30 wagons would be possible in the longer term if certain infrastructure improvements take place [18]. In its response to the RUS consultation phase, however, [19], the biggest of the container train operators, argued that train lengthening would be a visible solution in some situations but it is not a universal capacity enhancing measure [16], [17].

The company argues that even if route and terminal infrastructure was enhanced, commercial considerations are in some cases likely to limit the desirability of longer trains due to insufficient volumes, while in other instances factors such as maximum trailing weights have been reached given the currently available motive power [20].

Travel time reliability is concerned with the probability that a trip (Origin-Destination) will be made successfully within a specified time period. The definition of travel time reliability and the connectivity reliability are the same in essence; the connectivity reliability is a special case of the travel time reliability. The connectivity reliability is that which capacity obeys a 0-1 distribution [21].

IV. METHODOLOGY

The methodology employed in this research is the collection of data and analyzing it in way that will provide a reliable results. There are techniques and methods that can be used to gather necessary data. The method used in this process was through questionnaires; which have been distributed to employees from both road and rail organizations.

A. Questionnaires

The research tool for measuring the survey of the collected data is the questionnaire approach [22]. It is expected to be comprehensive and convey the intended question to the

identified respondents. The questionnaire has considered this seven basic principles:

- a) To be clear and precise;
- b) Response choices were not overlapping and were exhaustive;
- c) Employed natural and familiar language;
- d) Has not used words or phrases that are biased;
- e) Have avoided double-barrelled questions;
- f) Considered explicit alternatives as necessitated;
- g) Questions have met criteria for validity and reliability.

Consequently, questionnaires were distributed to employees from different organizations and complete a copy each. The respondents have not mention their names in the completed questionnaires, they have been assured that their responses to questions will be treated confidential and will be anonymous. This assurance to the respondents' will consequently impact on the answers to the completed questionnaires positively. Printed copies were given to employees from both rail and road organizations, in some cases some respondents prefer the questionnaires to be sent electronically. Hence, completed questionnaires are sent either through electronically or hard copies.

Questionnaires may have their disadvantages as well, in that respondents might take longer to respond or to submit the questionnaire. Others may not even go through the questions and understand what may be needed and they end up completing wrongly or skipping some questions. Questionnaires were sent out to both rail and road companies, of which only 132 respondents were contacted. The breakdown of the 132 is 50 respondents from the rail organization being Transnet Freight Rail, 52 from road company being Barloworld logistics and 30 also from road company namely Grindrod. There were restrictions in relation to the administering of questionnaires during this research study. The actual number of respondents was less than what the researcher aimed for. Also the respondents did not take the time frame that was asked for the completed questionnaires to be returned into consideration, as they took longer to return the completed questions. Some of the questions were not answered.

This research is about improving on the operational efficiencies in a view to attract customers to rail freight transportation. Employees have been the central point of focus because they have been interrogated about what was happening in their organizations.

V. COMPANY'S BACKGROUND

The organization at hand is leading railway freight transportation, with a world-class heavy haul freight reputation, specializing in freight transportation. In addition, it has a record of staff strength of approximately 25 000 employees, spread across the areas of operation within the country [4].

TRF as leading multinational rail Freight Company maintains and supports an extensive rail network across South Africa. This further extends and connects with other rail networks in the sub-Saharan region, with its rail infrastructure

representing about 80% of Africa's total [5], [23]. Transnet is one of the largest players in the business of freight logistics and transportation of goods across South Africa and beyond its boundaries to other part of African continent. The process of the logistics are basically moving cargo on ships for export and offloading goods imported from overseas. It is worth noting that Transnet Rail Freight's mission and vision is targeted at being Freight Transportation Company that delivers integrated efficient safe reliable and cost effective services to all their clients within and outside South Africa. The strategy set out to achieve all these goals is increasing the presence of their market share, improving productivity and profitability. Furthermore, by providing requisite support to clients both before and after services, these often instill some level of confidence to customers.

VI. RESULTS AND DISCUSSION

This research investigated the operational challenges encountered in the railways company (Transnet Freight Rail). The research was carried out so as to improve the rail operational challenges in a view of attracting more customers to do their business via railway transportation system. This will also help the society and environment by decreasing the number of road trucks damaging the roads and reduce carbon emissions that are on the road polluting the air and damaging the roads causing potholes. Challenges experienced with trains and trucks during delivery, quality management in the organization and management of challenges have an impact on the customer satisfaction.

From the data collected, road companies' shows less concern when it comes to the challenges encountered during the delivery of customers' products compared to rail. Most respondents from the road company where not concerned about the challenges encountered with trains during delivery, but also about the real operational problems, challenges in the organization and management of challenges.

Employees from the rail and road companies differ with regard to quality management, performance management and management of challenges in the organization. Railway employees show frustration in their organization that ultimately has a negative impact on the customer satisfaction.

VII. CONCLUSIONS

The results revealed that there are still some improvements that have to be implemented in the organization in order to satisfy the customer. Some of these area includes the involvement to empower and motivate the team, training and education to be offered to all employees. The objective of the study being to improve on the operational efficiencies of the railway company with a view of attracting more customers, it was shown in the results that most employees are extremely concerned with the late delivery of customer's products, and this will have an impact on the customer's production.

In the literature review it was stated that the hauling of trucks have a major impact on the infrastructure as well as the environment, by moving freight on rail this problem will be reduced and controlled.

From the data collected, road companies' shows less concern when it comes to the challenges encountered during the delivery of customer's products compared to rail. Most respondents from the road company were not concerned about the challenges whereas employees in the rail company were concerned, and not only concerned about the challenges encountered with trains during delivery, but also about the real operational problems, challenges in the organization and management of challenges.

ACKNOWLEDGEMENTS

The authors' wishes that thank all the respondents from different companies that completed and returned the questionnaires shared with them during the data collection stage of the research. We also appreciate the staffs of Statkon, university of Johannesburg for the assistance with the data analysis.

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