

Value of Time Drives Operational Costs of Road Freight Transport Operators (RFTO): A Case Study in Zimbabwe

Tapiwa. C. Mujakachi^{#1}, Marian Tukuta^{#2}, Maria Tsvere^{*3}

[#]*School of Entrepreneurship and Business Sciences, Chinhoyi University of Technology,*

^{*}*Life-Long Education, Chinhoyi University of Technology*

¹mujakachitc@gmail.com, ²tmtsvere@cut.ca.zw, ³mtukuta@cut.ca.zw

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Abstract- From a business viewpoint, freight transportation is a necessity in the globalized world we live in. Companies are becoming more dependent on goods from various different locations worldwide and the demand for coordinated transportation is increasing. The aim of the study was to ascertain if Road Freight Transport Sector in Zimbabwe respected the value of time aspect in their operations. Value of time is a sound principle that strategically propels the business into the future. Literature highly recommends the value of time concept for business success as a key to customer satisfaction and an international best practice. This was a quantitative study of the road freight transport sector across Zimbabwe with a population of 1256 registered companies and a randomly picked sample size of 384. A total of 384 questionnaires were distributed and 291 were retrieved, giving a response rate of 75.6%. The study findings indicate that value positively influence firm competitiveness. This implies that travel time and reliability influences company's reputation, profitability, customer satisfaction and market share. Several empirical studies have reached similar findings (Chi, King-lok, Steven, 2012; Song et al, Gitae, 2017) that value of time has positive impact on firm competitiveness. Study also found that all the registered companies that took part in the research confirmed that the value of time phenomenon was alien to their business practices as they worked on assumptions. They also indicated a loss of business due to customer complaints. The study recommends policy

formulation for companies that emphasizes standard operating procedures and good time management for firms to be competitive. The study results and interpretation show that value of time positively influences firm competitiveness. Results imply that if firms in the road freight sector conduct regular servicing of their fleet, train their employees, plan routes properly, respond to their customers and manage risks there can remain competitive.

Keywords: Value of Time, Competitiveness, Road Freight Sector, Customer Satisfaction

1. Introduction

Transit times are considered since long lead times require longer foresight and planning which creates uncertainty in demand. At the same time, companies try to reduce their cost of inventory. For these reasons among others, companies try to find the transport operator who can deliver the products in the shortest time provided where freight costs and related charges are reasonable.

An overall agreement in logistics literature is that times value positively influences competitiveness. Delivering to the customers a right product at the right time with reasonable price are vital objectives of efficient as well as effective supply chain [1]; [2]. Furthermore, literature has substantiated that competitiveness in the road freight sector is determined by on-time delivery [3]; [4]. The existing

literature further suggests that the value of time is a combination of delivery time, transportation time, and travel time [5];[6]; [7]. Therefore, firms in the road freight sector should ensure they deliver the consignments to their customers on time to enhance organizational competitiveness.

Many studies have been conducted on how travel time, delivery time and reliability influence firm competitiveness [8];[9]; The importance of travel time reliability in freight transport planning and operations has been emphasized by several authors, notably [10] and [11]. Ref [12] asserted that trip reliability positively impacts the competitiveness of firms in the road freight industry. Additionally,[13] indicated that firms should strive to meet delivery schedules to improve profitability and customer satisfaction. Ref [2] found out that value of time lead to firm competitiveness. Ref [14] echoed similar understandings and claimed that value of time impacts positively on competitiveness. In line with the literature review, the study thus sought to establish if the value of time concept among road freight transport sector was known and applied for organizational competitiveness.

2. Literature review

The value of time in freight transportation typically refers to a monetary value that decision makers (e.g., carriers and shippers) are willing to pay to decrease the transportation time when moving cargo from its origin to its destination. Knowledge of this value enables policy makers to conduct cost-benefit analyses of both infrastructure projects and service improvements, and forecast traffic demand [15]; [16]. Compared with its counterpart for passenger transportation, the VOT of freight transportation has received far less research attention because of the large number of decision makers, complicated negotiation processes, and limited data. Until now,

and except for [17] freight choice modelling typically assumed a single individual or enterprise as the sole decision maker [18]. Transport cost includes not only monetary cost but also time cost. The time cost is not directly measurable, so this paper concerns the method to estimate its value from available information. The development of transport technologies improves the productivity of the transport industry, largely due to the reduction of transport time through an increase in speed. Reduction of transport time has a great benefit on the economy: transport firms (carriers) save labour and capital costs; manufacturing firms (shippers) increase the value of their products; consumers enjoy fast delivery (e.g., increasing availability of fresh foods produced in distant locations). In the longer term, these benefits would be enhanced by modifying the ways of organizing economic activities; changes in the location of firms, reorganization of supply chain network, introducing more elaborate logistics (e.g., just-in-time system), etc. Previous studies have used four main approaches to measure the value of time (standard deviation, spread, share of delayed shipments, and average delay) but without reaching a common conclusion on which method to use. Similarly, previous studies also differ in what to measure, as delivery, transport and travel time have been used.

Moreover, VOTs in freight transportation present more heterogeneity, not only because of the diversity of applied definitions of time [19] and the applied calculation methods of VOTs [20];[21], but also because of inherent heterogeneities in freight transportation (e.g., largely differing shipment sizes and shipment values). Regarding definitions, delivery, transportation, and travel time are commonly used [22]. To date, many studies have explored a considerable number of factors that influence VOTs in specific situations. These studies

reported that socioeconomic variables [19] decision-maker types [23];[24], freight modes [15], transportation distance [25];[26], cargo categories [22];[15]; [27], and cargo value [28] all affect VOTs. More detail, a 1% increase in GDP per capita (GDPPC) has been reported to imply a 0.68% increase in VOT [19]. Moreover, different VOTs apply to exporters, freight forwarders, transporters, and manufacturing factories [23].

Due to the differences in cargo characteristics and decision makers' requirements, shipments with diverse VOTs are commonly transported via different modes. Among the four freight modes (air, road, rail, and water), shipments transported by air have the highest VOT, while shipments transported by water have the lowest VOT [15]. Ref [26] suggested that transportation needs to be completed on time for transportation to be efficient, which highlights the importance of time for shorter distances. This conclusion has been confirmed from an empirical perspective [29]; [30]. Few studies focused on freight VOT and typically assume a larger variation in the elasticities of freight VOTs than passenger VOT studies [27]. Relevant literature reviews addressing freight VOT are less common than those addressing passenger transportation, and only a limited number of studies conducted such an analysis for freight transportation, including [15],[19]), [31] and [32]. More recently, literature reviews have focused more on the willingness to pay for time reliability in freight transportation [33]. Ref [19] conducted pioneering work (the only contribution) on the quantitative study of VOTs in freight transportation.

2.1 Travel time

Travel time is an important input to cost–benefit analysis, particularly when comparing time-savings with other costs and benefits of a project. Traffic

forecasting is another area in which travel time is used as an input [15]. In freight and passenger transport, travel time is associated with maximising utility for firms and for passengers or workers. This maximisation problem is based on microeconomic theory, and is typically implemented using willingness-to-pay surveys and behavioural models to measure the travel time for people and or commodities [35]. Travel time is a key benefit of most of the freight and passenger transport improvements. In cost–benefit analyses, time savings account for about 80% of the monetary benefit of projects in total in the United Kingdom [35]. The freight transport, time savings in European countries represents a vital part of this percentage which is approximately a third of the time benefits [36]. The development of just-in-time logistics efficiency critically depends on reliable deliveries [37] which partly explains this attention.

2.2 Transport time

This involve the real duration of transport, which tends to be easily understood since commonly a proportional function of distance. Geographical constraints such as weather or technical limitations (e.g., operational speed) directly impact on transport time. Transport time on roadways is technically limited to legal speed limits. The limitation of maritime and air mainly concerns fuel economy and design speed. Although rail can accommodate a variety of speeds, schedules impose limited variations.

2.3 Frequency

In road freight, frequency involves the number of departures for a specific time range. The higher the frequency, the better the level of service. However, a high frequency ties up a larger quantity of vehicles and the risk of lower asset utilization. Distance is also a factor for lower frequency since transport

demand tends to decline accordingly. Combining long-distance travel and high frequency is an expensive undertaking for transport providers as a greater number of vehicles must be assigned to a specific route, as in the case of maritime container shipping.

2.4 Delivery Time

On-time delivery becomes more important to transport operators since this is considered a Key Performance Indicator (KPI). Many customers (distribution centers, retailers etc.) have delivery time windows which mean that deliveries can only be made between certain given times. This puts added pressure on transport and delivery planning of vehicles and goods. Increased traffic congestion due to an increase of traffic in general as well as infrastructure development lagging behind can cause unwanted delays and therefore, contingency plans need to be considered when planning transport operations. In logistics, delivery time entails delivering goods to business customers at the right time. Concerning on-time-time delivery, the transport operators need to sync orders with delivery schedules. The idea is to minimize the storage problem and maximize productivity. In addition, it requires close coordination between the players, and efficient planning and just-in-time logistics techniques to ensure that the right products are delivered to the right place at the right time. It can be useful, particularly for businesses that operate in fast-moving or highly competitive markets, where the ability to respond quickly to customer demand can be a key advantage. As effective as Just-in-Time delivery is, it can be difficult to coordinate large shipments efficiently, especially when dealing with shipments that vary in size and destination. Competitiveness in the globalization environment highlights the importance of becoming more efficient in the implementing operational and

administrative processes in companies to improve customer service levels, lead time, quality of products or services, and optimize resources [37].

3. Research Methodology

A positivism philosophy guided the study to spot patterns and make logical deductions. Positivism is based on measurement, control, and systematic observation [38]. The researchers' main objective was to establish the influence of transport costing on firms competitiveness in the road freight sector in Zimbabwe. This was a case study of 1256 registered road freight companies in Zimbabwe with Harare as the main hub for their operations. The quantitative research strategy helped researchers analyse data a formally and systematically [39]. To obtain a deep understanding of current reality, researchers constructed a model or prototype depicting the requirements, activities, parameters, costs, and organisational processes desirable for the success of the transport costing philosophy in the road freight transport sector [39]; [40]. The study adopted a cross-sectional survey design because it allowed researchers to use large samples; hence the study's sample size was 384, large enough for a cross-sectional survey to be employed. Additionally, the cross-sectional design allowed for a large amount of data to be collected once over a short period, giving room for the measuring relationships grounded on the study's hypotheses [39];[41]. The sample size was randomly determined from a population of 1256 registered road freight companies in Zimbabwe. The sample size for this study was determined using the formulae proposed by Krejcie and Morgan (1970);

$$S = \frac{X^2NP(1 - P)}{d^2(N - 1) + X^2P(1 - P)}$$

Where:

- χ^2 = the table value of chi-square for one degree of freedom at the desired confidence level (3.841);
 N = the population size.
 P = the population proportion (assumed to be 0.50 since this would be the maximum sample size); and
 d = the degree of accuracy expressed as a proportion (0.05)

Conferring to Krejcie and Morgan's (1970) formula the sample size for this study was 384 households at 95% confidence level. The sample size obtained was consistent with the principle that the sample should be at least 200 to meet the requirements of Maximum Likelihood Estimation [39]. Additionally, the sample size of 384 was also

justified following the recommendations by [42] that a minimum sample size of 200 is required to allow statistical analyses such as factor extraction which was performed in this study. Furthermore, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was done, and the sample was found to be statistically significant for each of the construct under investigation in the study [42]. Data were analyzed using SPSS, and results were presented in tabular form. All research ethics were complied with.

4. Results and Discussions

Table 1 below summarises of the descriptive analysis of the responses for operational costs. There are 6 items that were used to measure the value of time.

Table 1: Descriptive Statistics for value of time

Codes	Items	Mean	Std. Deviation
VOT1	The company does not conduct regular repair and maintenance on its fleet	3.98	1.059
VOT2	The company has inexperienced and trained workforce	4.26	.781
VOT3	The company has does not have proper route schedule that reduces transportation time	4.10	.906
VOT4	The company profits from delivering all consignment on time	3.94	.965
VOT5	The company has poor customer relationship management that often leads to poor customer satisfaction	4.00	.797
VOT6	The company has poor risk management mechanism which has increased transportation time	4.28	.782
Averages		4.09	0.881

Source: Survey data (2022)

Results in Table 1 above showed that the mean responses ranged between 3.98, SD = 1.059 (item VOT1) and 4.28, SD = 0.881 (item VOT6). The mean score was calculated, and it averaged (overall mean = 4.09; SD = 0.881) agree out of a possible score of 5 (strongly agree). This implied that firms in the road freight sector agreed that they did not

consider value of time in the costing management practices during the period understudy.

The objective of the study was to determine if road freight transport operators and their employees incorporated value of time in their strategy formulation for organizational competitiveness. Thus, it was hypothesised that,

H1: The value of time has a positive effect on firm competitiveness.

Table 2: Hypothesis test results for the value of time variable.

Hypotheses	Hypothesised Relationship	SRW	CR	Remark
H1	Value of time → competitiveness.	0.292	15.174***	Supported

Notes: SRW standardized regression weight, CR critical ratio, ** significant at $p < 0.05$, *** significant at $p < 0.001$

Table 2 above indicated that H_1 was statistically supported. The findings imply sufficient statistical support for direct relationships between value of time and firm competitiveness (COM). This suggested that the various components of the value of time contributed to company reputation, market share, profitability levels and customer satisfaction.

The study findings indicated that the value of time positively influenced firm competitiveness. This implied that travel time and reliability influences company's reputation, profitability, customer satisfaction and market share. Several empirical studies have reached similar findings [3];[2] that the value of time positively impacts firm competitiveness. This consolidates the position of this study that are consistent with a majority of empirical studies, attaining conclusive results as more studies report similar findings. A sizeable number of scholars have publicized that competitiveness of firms in the road freight sector is determined by on-time delivery [3];[44]; [9].

Ref [45] posits that to ensure growth and survival, firms in the road freight sector should ensure that they deliver the consignments to their customers on time. In like a manner, [13] indicated that firms should strive to meet delivery schedules to improve profitability and customer satisfaction.

5. Conclusion

The study sought to understand whether relationship exists between value of time and firm competitiveness. The study results and interpretation show that value of time positively influences firm competitiveness. Results imply that if firms in the road freight sector conduct regular servicing of their fleet, train their employees, plan routes properly, respond to their customers and manage risks there can remain competitive. As a result, the purpose of this study was to add to the current body of logistics and transport knowledge by

investigating the impact of value of time as a driver of operational cost in road freight transport. Globally, there has been a dearth of logistics studies that have specifically focused on the relationship between value of time as a driver of operational cost on firm competitiveness.

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