Turnaround Times and Freight Wagon Competitiveness: Evidence from Tanzania Railways Corporation

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Abstract

Turnaround time remains a major constraint to the competitiveness of freight operations at Tanzania Railways Corporation (TRC). This study examined the effect of turnaround time on the competitiveness of TRC's freight services, focusing on three critical components: cargo handling time, maintenance time, and wagon retention time. Adopting a positivist philosophy and a quantitative, explanatory research design, the study sampled 171 participants, comprising TRC staff and freight clients, of whom 152 responded. Data were collected through structured questionnaires and analyzed using descriptive statistics and multiple regression analysis. Results revealed that cargo handling time (ß = - 0.143, Sig. = 0.087) had an insignificant negative effect on competitiveness while wagon retention time (ß = -0.243, Sig. = 0.000) had a significant negative effect. Conversely, maintenance time (ß = 0.333, Sig. = 0.000) demonstrated a significant positive impact. These findings imply that inefficiencies in cargo handling and prolonged wagon retention undermine TRC's service competitiveness, while effective maintenance contributes positively to. The study recommends that TRC invest in advanced technologies, workforce training, and preventive maintenance. Additionally, improvements in scheduling and logistics coordination are necessary to minimize retention time and enhance overall operational performance and service appeal. This study contributes empirical evidence from Sub-Saharan Africa to the limited literature on rail freight turnaround times, offering managerial insights for improving operational efficiency in state-owned railway corporations.

Keywords: Freight Wagon Turnaround, Rail Freight Competitiveness, Cargo Handling Efficiency, Railway Operations Management, Tanzania Railways Corporation

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Introduction

In many countries of the world, railways play a key role in freight transportation by facilitating the movement of goods through hinterlands (Adero & Aligula, 2012). Freight rail transport accounts for 7% of total transportation across all modes globally. Rail transportation is considered an efficient mode due to its safety and cost-effectiveness, particularly for the movement of large volumes of freight over long distances (Arha et al., 2024).

For instance, in the United States (US), the cost per ton-mile of rail transportation is 0.04 USD, whereas freight by road trucks is 0.12 USD and by airfreight is 1.36 USD per ton-mile (Arlotto et al., 2019). However, the freight cost per ton-mile varies across countries, with lower costs

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generally reported in developed nations, particularly the US. Despite this, challenges related to freight delays have caused rail to lose market share to other transport modes. The cost implications of delays have made overall rail freight more expensive (Arora et al., 2024). Globally, in 2024, 47% of freight trains failed to arrive on schedule, though this represents a slight improvement of 0.73% compared to 2023.

The rail freight transport market has been declining due to increased client preference for alternative transport modes. Between 2007 and 2021, the global market share of inland rail freight transport declined by 11%, reflecting diminishing competitiveness (Arha et al., 2024). Inefficient rail operations that disrupt logistics and supply chains have raised concerns among logistics stakeholders. Although rail has the potential to support efficient transportation systems, it continues to face operational challenges related to time delays (Büchel et al., 2020).

These inefficiencies impact the broader railway network, and poorly managed rail operations frequently result in prolonged delays for freight wagons, affecting operators and overall supply chain sustainability (Corman et al., 2018). This, in turn, reduces service quality and generates conflict among stakeholders (Daramola, 2022). In developing countries such as India, Bangladesh, and Brazil, several studies have cited multiple causes and consequences of rail freight inefficiencies (Leonard & Macha, 2021). For instance, in India, persistent problems such as the inability to maintain schedules hamper the system's effectiveness (Fincham, 2008).

Rail systems in these contexts experience overloading, lack of adequate servicing, poor scheduling, and operator shortages (Freeman, 1994). Efficient wagon transport depends on well-planned scheduling and coordination across multiple stations (Githaiga, 2021). Without these, cargo transport becomes inefficient. Mazibuko et al. (Mulke et al., 2024) argue that the absence of planned wagon operations has significantly hindered rail performance.

In African countries, freight wagon turnaround delays are widespread. South Africa, for example, reports persistent delays in its mining sector supply chain (Krüger & Vierth, 2015). Similarly, in Kenya, delays continue despite the development of the Standard Gauge Railway (SGR) from Mombasa (Mussa et al., 2023). In Nigeria, efforts to enhance freight efficiency have yielded limited success due to poor freight management systems. South African rail freight also suffers from inefficient handling systems at stations.

Infrastructural inadequacies remain a key source of service disruptions. In many African railways, poor planning and train scheduling are primary causes of low freight system performance. Tanzania's railway system operates freight services along two major corridors central and northern (PISA, 2021). For years, the government of the United Republic of Tanzania (URT) has invested in railway infrastructure to improve freight efficiency and reliability.

Nevertheless, efforts to address delays have proven insufficient, undermining the system's ability to meet customer expectations (Tanzania Railways Corporation [TRC], 2019). Operational inefficiencies in the movement of wagons necessitate urgent intervention. Overexploitation of wagons and compromised wagon integrity have further escalated these challenges. According to the Resource-Based View (RBV) theory, TRC can improve competitiveness by effectively leveraging its internal resources and infrastructure.

These inefficiencies have disrupted haulage operations, causing delays in logistics and supply chain activities (World Bank, 2014). Freight clients increasingly face reliability challenges that diminish their confidence in rail transport. Unlike passenger trains, which follow fixed

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schedules, freight trains in Tanzania operate under less structured systems and are often manually controlled by section controllers.

The lack of local empirical studies on the relationship between turnaround time and freight performance creates a gap in knowledge. While studies in South Africa, Kenya, and Nigeria highlight persistent turnaround inefficiencies, empirical evidence specific to Tanzania remains limited. This creates a knowledge gap regarding the operational drivers of freight wagon competitiveness in TRC. This study, therefore, aims to contribute toward understanding the reasons behind TRC's reduced efficiency and competitiveness compared to other modes of transport.

Theoretical Reference

Resource-Based Theory

This study adopts the Resource-Based Theory (RBV) to interpret and discuss findings in relation to the competitiveness of Tanzania Railways Corporation (TRC) in freight wagon operations. RBV, introduced by Penrose, posits that a firm's competitive advantage is derived from its ability to effectively manage and utilize its internal resources and capabilities (Githaiga, 2021). The theory assumes that organizations possess a unique bundle of resources which, if properly leveraged, can drive change and enhance competitiveness (Daramola, 2022). Although RBV has been criticized for its limited explanation of how resource utilize ation directly translates into competitive outcomes, its extensive application across industries emphasizes its theoretical relevance. In the context of rail operations, RBV emphasizes that wagons, scheduling systems, and maintenance capacity constitute strategic resources whose management determines service competitiveness. In this study, RBV is used to explain how turnaround time comprising cargo handling, maintenance, and wagon retention 9km is influenced by TRC's internal resource availability. The theory provided a framework to assess how capabilities such as timely cargo handling, efficient maintenance of wagons, and reduced retention delays contribute to service efficiency. Thus, RBV guided the study in linking TRC's internal resources with the operational efficiency and competitiveness of its freight wagon transport services.

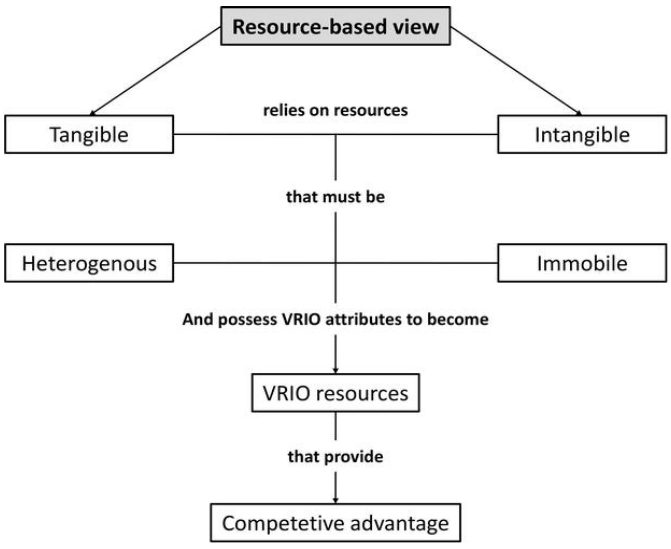

Figure 1: Resource-Based View (RBV) and its Key Points.
Source: Githaiga (2021)

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Conceptual Framework

Cargo handling time, which includes all activities from cargo pickup to loading and unloading, directly affects rail freight competitiveness. Reduced handling time lowers operational costs, enhances client satisfaction, and increases customer loyalty, thereby attracting more users and expanding market share. Maintenance time, occurring at any point during freight transit, contributes to overall turnaround time. Faster maintenance reduces operational costs and improves client satisfaction, enhancing competitiveness. Conversely, prolonged maintenance increases cost and reduces client preference, leading to decreased freight volume and market share. Retention time, which involves delays due to train scheduling and coordination, significantly extends turnaround time. Longer retention periods result in higher operational costs and customer dissatisfaction, making rail freight less competitive and prompting clients to shift to alternative transport modes. Thus, cargo handling time, maintenance time, and retention time each have a direct effect on the competitiveness of rail wagon freight. The framework provides interconnection between independent and dependent variables to understand the relationship.

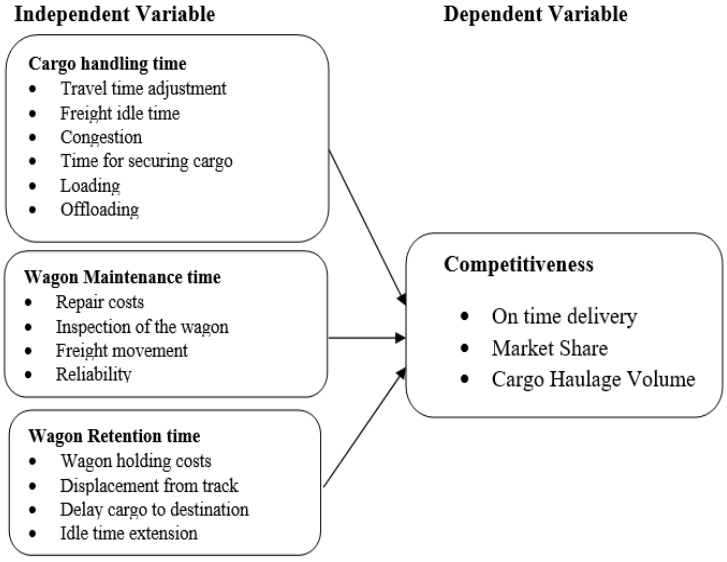

Figure 2. Conceptual Framework on The Effects of Turnaround Times on Freight Wagon Competitiveness

Source: Adopted from Nikiforova (2022)

Methods

This study adopts a positivist research philosophy to objectively examine the relationship between freight wagon turnaround time and the competitiveness of Tanzania Railways Corporation (TRC). A quantitative research approach was employed to enable statistical analysis of the relationships between the independent and dependent variables. The study utilized an explanatory research design, suitable for identifying cause-and-effect relationships between turnaround time variables and freight competitiveness. The study population comprised TRC staffs and freight clients, who were directly involved in the operation and utilization of TRC's freight wagon services. A sample of 171 respondents was selected through simple random sampling to ensure equal representation and minimize bias. However, 152 respondents fully participated, resulting in an 89% response rate. The sample size of this study was determined using the Yamane formula (1967). With a population of N = 300 total TRC

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staff and client count, the formula produced a sample size of 171 at a 95% confidence level and 5% margin of error

$$n = \frac{N}{1+Ne^2}$$

where:

n = sample size required

N = total population size

e= margin of error

Data were collected using structured questionnaires containing both closed-ended and scaled questions. The questionnaire was organized into sections corresponding to key variables: cargo handling time, maintenance time, wagon retention time, and freight competitiveness. The instrument was pre-tested to ensure reliability and validity, and necessary modifications were made before actual data collection. Reliability of questionnaire constructs was confirmed with Cronbach's alpha values all above 0.7, ensuring internal consistency with the help of IBM SPSS Statistics. Descriptive statistics were used to summarize demographic characteristics and response patterns. Inferential analysis, particularly multiple regression and correlational analysis were used to test the influence of independent variables (turnaround time components) on the dependent variable (freight competitiveness). Significance levels were set at $p < 0.05$. The study employed the following multiple regression model equation.

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$

Where

Y= Competitiveness; β= coefficient of variables, ε=error

X_1=Cargo handling time,

X_2=Wagon maintenance time,

X_3=Wagon retention time.

Result and Disscusion

Effects of cargo handling time on Competitiveness of TRC

The study's first objective was to assess the effect of cargo handling time on the competitiveness of Tanzania Railways Corporation (TRC). Findings indicate that cargo handling time is a significant factor influencing freight wagon efficiency. Respondents moderately agreed (mean = 3.566) that cargo handling time affects travel timetable adjustments, suggesting its role in operational scheduling. A high mean score (4.382) showed strong agreement that cargo handling time contributes to train idle time. Similarly, respondents moderately agreed that cargo handling time increases the time needed to access cargo (mean = 3.533) and contributes to congestion at stations (mean = 4.178). The belief that it increases the time required to secure cargo also received moderate support (mean = 3.684). However, the lowest mean score (2.461) was recorded for the impact of cargo handling time on train marshalling, indicating weak agreement. Overall, the results demonstrate that cargo handling time significantly affects operational delays and station congestion, thereby influencing TRC's freight service competitiveness.

Table 1. Effects of Cargo Handling Time on Competitiveness of TRC

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	The construct Statement	Mean	S.D
1	Cargo handling time led to time adjustment of travel timetables	3.57	1.69
2	Cargo handling time contributes to train idle time in freight wagon	4.38	4.40
3	Time for accessing cargo increase due to cargo handling time	3.53	1.56
4	Cargo handling time led to increase congestion in the station	4.18	1.04
5	Cargo handling time increase time for securing the cargo	3.68	1.48
6	Train Marshalling is always affected by cargo handling	2.46	1.47

Source: Field Data, 2025

Effects of Wagon Maintenance Time on Competitiveness of TRC

The second objective focused on evaluating the effect of wagon maintenance time on the competitiveness of Tanzania Railways Corporation (TRC). Overall, respondents moderately acknowledged its impact on service performance. Definitely wagon maintenance time was seen to moderately reduce the reliability of freight operations (mean = 3.17) and increase repair costs (mean = 3.053). Respondents also agreed that wagon inspection during maintenance contributes to longer turnaround times (mean = 3.78), while actual repairs of faulty components received weaker agreement (mean = 2.71). However, the view that documented repairs during maintenance increase turnaround time was strongly supported (mean = 4.10). Additionally, a high mean score (3.86) indicated strong agreement that wagon maintenance disrupts the smooth movement of freight. These findings suggest that wagon maintenance time plays a distinguished role in delaying operations and diminishing competitiveness in TRC's freight services.

Table 2. Effects of wagon maintenance time on Competitiveness of TRC

	The Construct Statement	Mean	S.D
1	Wagon maintenance time lower reliability of freight operations	3.17	1.60
2	Wagon maintenance time led to increased repair costs	3.05	1.5517
3	Inspection of the wagon during maintenance increase turnaround time	3.78	1.41
4	Repair or fix the part of wagon with fault increase turnaround time	2.71	1.6056
5	Documenting the repair during maintenance increase turnaround time	4.10	1.26
6	Wagon Maintenance time disrupt smooth movement of freight	3.86	1.21

Source: Field Data, 2025

Effects of Wagon Retention Time on Competitiveness of TRC

The third objective aimed to assess the effect of wagon retention time on the competitiveness of Tanzania Railways Corporation (TRC). Findings reveal mixed perceptions among respondents. Most disagreed that wagon retention time increases holding costs for clients (mean = 2.97), and also disagreed with the claim that it causes wagon displacement from the track (mean = 2.80). However, there was moderate agreement that wagon retention time leads to increased rail line traffic (mean = 3.68), cargo delivery delays (mean = 3.51), and extended idle time (mean = 3.40). Notably, the highest agreement was with the statement that wagon retention time delays scheduled freight train operations (mean = 4.08, indicating strong concern over its disruptive impact on scheduling. Overall, the findings suggest that wagon retention time adversely affects TRC's freight efficiency, primarily through congestion and schedule delays, thereby undermining its competitiveness.

Table 3. Effects of Wagon Retention Time on Competitiveness of TRC

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	The Construct Statement	Mean	S.D
1	Wagon retention time increases holding costs to clients	2.97	1.58
2	Wagon retention time led to increased traffic in the rail line	3.68	1.47
3	Wagon retention cause disruption hence delay cargo to destination	3.51	1.47
4	Wagon retention time wagon led to displacement of wagon from track which increase time	2.80	1.58
5	Wagon retention time extend travel idle time hence freight delay	3.40	1.55
6	Wagon retention time cause delay of schedule time for freight train cargo	4.08	1.15

Source: Field Data, 2025

Correlation Analysis

The findings reveal different relationships between turnaround time components and the competitiveness of Tanzania Railways Corporation (TRC) freight services. Cargo handling time shows a weak but statistically significant negative correlation with competitiveness ($r = -0.163$, $p < 0.01$), indicating that increased handling durations slightly reduce service competitiveness. Similarly, wagon retention time also shows a weak negative correlation ($r = -0.144$), though it is statistically insignificant ($p > 0.01$), suggesting it has limited predictive power regarding competitiveness. In contrast, wagon maintenance time demonstrates a moderate and statistically significant positive correlation with competitiveness ($r = 0.300$, $p < 0.01$), implying that effective and possibly time-consuming maintenance activities enhance operational performance and client satisfaction. Overall, while prolonged handling and retention times tend to hinder TRC's freight competitiveness, efficient maintenance practices contribute positively to improving service performance.

Table 4. Correlation Analysis

		Cargo Handling Time	Maintenance Time	Retention Time	Competitiveness
Cargo Handling Time	Pearson Correlation	1	.022	.141	-.163*
	Sig. (2-tailed)		.786	.083	.044
Maintenance Time	Pearson Correlation	.022	1	.441**	.300**
	Sig. (2-tailed)	.786		.000	.000
Retention Time	Pearson Correlation	.141	.441**	1	-.144
	Sig. (2-tailed)	.083	.000		.077
Competitiveness	Pearson Correlation	-.163*	.300**	-.144	1
	Sig. (2-tailed)	.044	.000	.077	
*. Correlation is significant at the 0.05 level (2-tailed).					
**. Correlation is significant at the 0.01 level (2-tailed).					

Source: Field Data, 2025

Multiple regression Analysis

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The regression results show that cargo handling time, wagon maintenance time, and wagon retention time together explain 20.1% of the variation in TRC's freight competitiveness (R^2 = 0.201). The adjusted R^2 of 0.184 indicates a modest model fit. The correlation coefficient (R = 0.448) suggests a moderate positive relationship between the predictors and competitiveness. The standard error (0.53712) reflects moderate variability in prediction accuracy. Overall, the model explains a limited but meaningful percentage of competitiveness, with other factors likely influencing the remaining variation.

Table 5. Model Summary

Model	R	R^2	Adjusted R Square	Std. Error of the Estimate
1	.448[a]	.201	.184	.53712

Source: Field Data, 2025

The multiple regression results indicate that, when all variables are held constant, the predicted competitiveness of TRC's freight services is 2.798 ($p < 0.05$). Cargo handling time has a negative but statistically insignificant effect on competitiveness (ß = -0.143, $p > 0.05$; β = -0.128), indicating a small negative influence. Wagon maintenance time shows a positive and statistically significant impact (ß = 0.333, $p < 0.05$; β = 0.445), making it the strongest positive contributor to competitiveness. Wagon retention time has a statistically significant negative effect (ß = -0.243, $p < 0.05$; β = -0.322), implying it moderately reduces competitiveness. Overall, maintenance time enhances TRC's freight competitiveness, while cargo handling and retention times negatively impact it.

Table 6. Multiple Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		ß	Std. Error	Beta		
1	(Constant)	2.798	.333		8.410	.000
	Cargo handling time	-.143	.083	-.128	-1.722	.087
	Wagon maintenance time	.333	.061	.445	5.424	.000
	Wagon retention time	-.243	.062	-.322	-3.887	.000

a. Dependent Variable: Competitiveness

Source: Field Data, 2025

Discussions

Cargo Handling Time and Competitiveness

Cargo handling time was found to have a negative and statistically significant effect on the competitiveness of TRC freight operations (β = -0.325, p = 0.000). Although the effect was weak, it highlights that extended handling time adversely affects service delivery through train idle time, delays in cargo access, and increased station congestion (Daramola, 2022). According to the RBV framework, efficient cargo handling is a valuable internal resource and operational capability that can give a firm sustainable competitive advantage if well managed. Moreover, the study found that poor cargo handling results in underutilization of key tangible assets such as wagons and locomotives and increases operational effects, which compromise service punctuality and throughput.

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This aligns with different studies indicating that inefficient cargo handling is a major determinant of service delays in both developed and underdeveloped railway systems (Krüger & Vierth, 2015; Arora et al., 2024). The consequences of inefficient cargo handling also extend to reduced client trust and weakened brand reputation due to delays and rising demurrage costs (Büchel et al., 2020). Additionally, terminal congestion and delayed train arranging due to slow cargo processing were reported to further disrupt logistical coordination. Efficient arranging, if digitized and properly scheduled, is considered by RBV as a unique logistical capability that can enhance reliability and reduce operational complexity (Corman et al.,2018). Therefore, improving cargo handling processes at TRC through digital systems and modern infrastructure can transform these functions into competitive advantages (Daramola, 2022).

Wagon Maintenance Time and Competitiveness

Wagon maintenance time showed a positive and statistically significant contribution to competitiveness ($\beta = 0.333$, $p = 0.000$), indicating that despite the time consumed, timely and well-managed maintenance improves service reliability and customer satisfaction (Adero & Aligula, 2012). Under the RBV theory, maintenance efficiency is an internal capability that enhances a firm's ability to utilize its assets productively, leading to competitive performance (Katuga et al., 2024). However, prolonged maintenance periods were reported to increase repair costs, lower wagon availability, and delay schedules issues that can weaken client confidence and affect system throughput (PISA, 2021). The study also indicated that inefficient documentation and spare parts unavailability contribute to extended downtime.

According to different studies, predictive maintenance and digital inventory systems are recommended to mitigate these delays and reduce repair-related costs (Corman et al., 2018; Fincham, 2008). Furthermore, frequent inspection requirements were mentioned as factors contributing to increased turnaround time. These inspections, though critical for safety, must be optimized to avoid prolonged service disruption. As highlighted by Freeman (1994), balancing safety compliance with operational efficiency is essential for service quality. According to RBV, maintenance scheduling and inspection processes, when refined and institutionalized, become intangible assets that improve the firm's adaptability and service continuity (PISA, 2021).

Wagon Retention Time and Competitiveness

Wagon retention time showed a negative and statistically significant impact on TRC's freight competitiveness ($\beta = -0.243$, $p = 0.000$). Retention time refers to the idle duration wagons spend at terminals or sidings, which often results from coordination lapses or system effects. The study revealed that increased retention time leads to holding costs for clients, congestion in rail infrastructure, and service delays factors that hinder operational efficiency and customer satisfaction. From the RBV perspective, wagon utilization reflects how well physical assets are exploited for economic value. Excessive retention signifies poor asset productivity and inefficiencies in scheduling and coordination, thereby reducing TRC's capacity to serve more clients or expand operations (PISA, 2021). Similar observations were made by Githaiga (2021) and Büchel et al. (2020), who emphasized that delays stemming from poor scheduling and retention disrupt service regularity and ultimately diminish customer loyalty.

Retention also affects track availability, prompting displacement of wagons and logistical complexity. point out, such dislocations are indicative of weak asset planning and underdeveloped operational routines. TRC's capacity to reduce such inefficiencies would strengthen its ability to deliver predictable, timely, and cost-effective services a central tenet

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of the RBV theory (PISA, 2021). Theoretically, this study extends RBV by demonstrating that intangible scheduling capabilities and tangible resources such as wagons interact to shape freight competitiveness. In particular, maintenance efficiency emerges as a dynamic capability that enhances value creation in rail freight services.

Novelty of the Study

This study advances the understanding of railway freight competitiveness by examining the effects of cargo handling time, wagon maintenance time, and wagon retention time on operational performance at Tanzania Railways Corporation (TRC) through the lens of the Resource-Based View (RBV) theory. It demonstrates that inefficient cargo handling and excessive wagon retention negatively affect service reliability, asset utilization, and customer satisfaction, while well-managed wagon maintenance positively contributes to competitiveness by enhancing operational efficiency and reliability. The study integrates tangible assets and intangible operational capabilities, highlighting how digitalization, predictive maintenance, and optimized scheduling can transform routine processes into strategic resources. By linking internal capabilities to freight competitiveness, the research provides both theoretical and practical insights for improving service delivery and market performance in developing railway systems.

Conclusion

This study examined the effects of turnaround times by focused in three variables that are cargo handling time, wagon maintenance time, and wagon retention time on the competitiveness of freight wagons at Tanzania Railways Corporation (TRC), guided by the Resource-Based View (RBV) framework. The findings revealed that prolonged cargo handling leads to idle time, congestion, and disruptions in marshalling, thereby lowering efficiency. Extended wagon maintenance times cause reduced wagon availability, rising repair costs, and operational delays, while inefficient scheduling and documentation exacerbate these issues. Additionally, excessive wagon retention results in increased client costs, rail congestion, and diminished customer satisfaction.

Suggestions

The study recommends TRC to invest in modern handling technologies, adopt preventive maintenance strategies, and implement improved scheduling to optimize internal capabilities and enhance competitiveness. This study is limited by its focus on TRC only; future research could extend the analysis to Tanzania Zambia Railway Authority (TAZARA) and other East African railway systems for comparative insights. Additionally, qualitative exploration of managerial decision-making around scheduling and maintenance could enrich the quantitative findings.

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References

DOI: https://doi.org/10.47667/ijppr.v6i4.401

Adero, N., & Aligula, E. (2012). Challenges facing transport infrastructure in the East African Community. *Research Networking and Regional Development Policy Making in the East Africa Community (EAC), 90-113: Kenya Institute for Public Policy Research and Analysis (KIPPRA)*.

Arha, H., Arora, K., Sohoni, M. G., & Gopalakrishnan, R. (2024). A structural analysis of freight delays in the indian railway network. In *Available at SSRN 4631346*.

Arlotto, A., Frazelle, A. E., & Wei, Y. (2019). Strategic open routing in service networks. *Management Science*, *65*(2), 735-750. https://doi.org/10.1287/mnsc.2017.2971

Arora, K., Zheng, F., & Girotra, K. (2024). Private vs. pooled transportation: Customer preference and design of green transport policy. *Manufacturing & Service Operations Management*, *26*(2), 594-611. https://doi.org/10.1287/msom.2022.0569

Büchel, B., Spanninger, T., & Corman, F. (2020). Empirical dynamics of railway delay propagation identified during the large-scale Rastatt disruption. *Scientific reports*, *10*(1), 18584. https://doi.org/10.1038/s41598-020-75575-y

Corman, F., Quaglietta, E., & Goverde, R. M. (2018). Automated real-time railway traffic control: an experimental analysis of reliability, resilience and robustness. *Transportation planning and technology*, *41*(4), 421-447. https://doi.org/10.1080/03081060.2018.1453916

Daramola, A. (2022). A comparative analysis of road and rail performance in freight transport: an example from Nigeria. *Urban, Planning and Transport Research*, *10*(1), 58-81.

Fincham, J. E. (2008). Response rates and responsiveness for surveys, standards, and the Journal. *American journal of pharmaceutical education*, *72*(2). https://doi.org/10.5688/aj720243

Freeman, R. E. (1994). The Politics of Stakeholder Theory: Some Future Directions, in "Business Ethics Quarterly", 4 (4).

Githaiga, N. M. (2021). The Successes and Challenges of Kenya" s Mombasa-Nairobi Standard Gauge Railway Transport Operations: A Special Reference to the Users.

Katuga, Y. S., Kivugo, R. O., & Chombo, P. V. (2024). Reliability Improvement in the Traction System of Tanzania Standard Gauge Railway. *Tanzania Journal of Engineering and Technology*, *42*(4), 108-117.

Krüger, N. A., & Vierth, I. (2015). Precautionary and operational costs of freight train delays: a case study of a Swedish grocery company. *European Transport Research Review*, *7*(1), 6. https://doi.org/10.1007/s12544-015-0155-7

Leonard, E., & Macha, L. (2021). The effects of the Tanzanian railway network in the performance of the rail freight operations. A Case of Dar es Salaam to Isaka. *International Journal for Innovation Education and Research*, *9*(4), 91-109.

Mülke, F. J., Havenga, J. H., & van Eeden, J. (2024). Systemic efficiency and capacity: A vital combination in the design of dedicated rail freight projects in Southern Africa. *Journal of the South African Institution of Civil Engineering*, *66*(2), 2-16. https://doi.org/10.17159/2309-8775/2024/v66n2a1

DOI: https://doi.org/10.47667/ijppr.v6i4.401

Mussa, R. K., Yeom, C., & Lee, S. (2023). Analysis of risk factors associated with railway projects in Tanzania. *The Open Transportation Journal*, *17*(1).

Pisa, N. M. (2021). Innovations to improve rail freight efficiency: considerations for emerging economies. *Journal of Contemporary Management*, *18*(1), 223-242.

DOI: https://doi.org/10.47667/ijppr.v6i4.401