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Beyond Border Delays: Explaining Cross-Country Variation in Road Freight Transit Time Along East Africa's Northern Corridor

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ABSTRACT: Efficient road freight transit is essential for regional trade integration, supply-chain reliability, and the competitiveness of landlocked economies served by East Africa's Northern Corridor. However, freight movements may be delayed by administrative and regulatory stops, including police/security checks, customs inspections, weighbridges, and border-post procedures. This article examines the association between recorded durations of these four categories of stops and country-specific total transit time using shipment-level data. The Kenya regression model explains 29.6% of the variation in total transit time ($R^2 = 0.296$). All four stop-time variables are positively and statistically significantly associated with total transit time, with customs checks recording the largest coefficient ($\beta = 1.495$, $p < 0.001$). The Uganda model uses 390 observations and explains 73.2% of the variation ($R^2 = 0.732$). All four variables are positive and statistically significant, with customs checks again recording the largest coefficient ($\beta = 1.329$, $p < 0.001$). South Sudan has only 13 positive observations, making its estimates exploratory. Customs checks and border-post procedures are statistically significant, while police/security checks and weighbridges are not. Rwanda has four positive observations, whereas Burundi and Tanzania have none, preventing reliable country-specific estimation. The findings indicate associations rather than causal effects. If stop durations are components of total transit time, part–whole correlation may inflate the estimated relationships. The article recommends harmonised data definitions, interoperable customs systems, risk-based inspections, coordinated border management, and transparent performance monitoring, supported by rigorous validation of transit-time data.

KEYWORDS: road freight, transit time, non-tariff measures, customs; weighbridges, border management, Northern Corridor, East African Community.

1. INTRODUCTION

Road transport corridors link seaports, production hubs, and inland markets, thus being crucial for regional trade. The Northern Corridor, which relies on the Port of Mombasa, is important for Kenya as well as surrounding economies such as Uganda, Rwanda, Burundi, South Sudan, and eastern Democratic Republic of the Congo (Hummels & Schaur, 2013). In the case of landlocked countries, the timeliness and efficiency of transit will influence inventory costs, scheduling, market reach, and costs of imports and exports. Transit efficiency becomes an issue for both the transport sector and trade facilitation (Northern Corridor Transit and Transport Coordination Authority, 2025).

The time that a freight takes involves both productive time and idle time caused by inspections, border crossing procedures, weighings, security clearance, breaks, among others. While the former type of stops is necessary for compliance with various regulations and security considerations, too many and poorly coordinated stops may render road transport inefficient. The transport time is a significant factor in the cost of doing business, as the delay could raise the costs of holding the stock, disrupt timetables, and make international trade less competitive (Hummels, 2007; Hummels & Schaur, 2013). This implies that the effectiveness of a transport corridor does not depend only on the state of its road infrastructure but also on the effectiveness of its administrative and regulatory processes.

An administrative stop is likely to cause unnecessary delays if agencies engage in duplicate inspections, duplicate documentation, or follow separate procedures in which coordination fails. Poor communication, manual systems, poor inspection equipment, and

lack of consistency are likely to contribute to waiting times even in regions where there is good road infrastructure. From a study on African trade and logistics, delays in land transport along the route to ports appear to be correlated with the level of exports (Freund & Rocha, 2011). Likewise, studies on transport infrastructure and trade costs reveal that geographic factors and transport infrastructure performance impact the cost of linking producers to their internal and external markets (Limão & Venables, 2001). The Trade Facilitation Agreement of the World Trade Organization (TFA) presents an international model to facilitate the reduction of unnecessary procedural delays by the simplification, modernization, and harmonization of trade procedures. Measures advocated by Article 7 include such actions as pre-arrival processing, electronic payment, risk management, post-clearance audit, and the measurement of average release times. Article 8 seeks even to enhance cooperation between border agencies, such as joint controls and the establishment of one-stop border posts (World Trade Organization [WTO], 2017). This allows border agencies to focus on high-risk consignments and release low-risk consignments more quickly. Thus, it should be noted that trade facilitation does not mean merely cutting down controls; rather, it means improvement in targeting, transparency, and coordination of controls.

One-stop border posts and border management regimes have been advocated for in East Africa in order to eliminate duplication and enhance cargo transit across international borders. Through the coordination of checks carried out by border officers of neighboring countries, one-stop border posts can serve to lessen the repetition and duplicity in clearance processes. The joint report by the Northern and Central Corridor transport authorities explains how such a regime can be used to ease border controls, even if there are challenges to operations in terms of infrastructure and staff capacity (Northern Corridor Transit and Transport Coordination Authority & Central Corridor Transit Transport Facilitation Agency, 2020).

Nevertheless, the effectiveness of such a structure does not necessarily depend on their establishment per se but on whether they are effectively implemented. The discrepancies in terms of working time, mandate of agencies, computerized system used by them, inspection capacity, and enforcement practice may continue to cause delays regardless of the availability of common infrastructure. In the case of the Northern Corridor, it becomes even more relevant since goods that move from the port of Mombasa to inland stations have to go through all the regulations of transport infrastructure. It can become the determining factor in terms of transit time of the entire route. However, one should evaluate the impact of each control separately since it can give substantial public benefits and cannot be shortened in order to save time on account of security or lawfulness. Therefore, the task of the policy is to eliminate the unnecessary duplication and make the process more efficient via the use of digitization, risk-based inspection at risk, and monitoring of release time.

1.2 Objective

This study builds on that perspective by examining the relationship between recorded checkpoint-related durations and country-specific transit times along the Northern Corridor, while recognising that the interpretation of these associations depends on the precise definitions and measurement of the variables. Therefore, this article investigates the relationship between four categories of recorded stop time police/security checks, customs checks, weighbridges, and border-post procedures and country-specific total transit time.

2. LITERATURE REVIEW AND ANALYTICAL FRAMEWORK

2.1 Transit time, trade costs and reliability

Transit time is an economically significant element of the trade cost basket. Longer or more uncertain transport times may lead to higher levels of required inventories, higher needs for working capital, and lower reliability of production and retail planning. In a seminal paper, Hummels (2007) illustrates why time costs become an important part of transport costs and tariff costs. Evidence shows that each additional day of export delays decreases trade by more than 1% on average, and in the case of time-sensitive products (including perishable agricultural products), the effect is even stronger (Djankov et al., 2010). Similarly, according to estimates of Hummels and Schaur (2013), each additional day in transit is worth an ad valorem tariff of 0.6–2.1%. For the users of the transport corridor, the critical issue is not just the average length of the trip but also its predictability. Factors affecting transit time include distance, road quality, traffic intensity, vehicle condition, driving practices, security, border procedures, cargo characteristics, and regulatory procedures organization. Administrative stops can be justified and unavoidable, but redundant or ill-sequenced stops will create unnecessary waiting.

2.2 Non-tariff measures and trade facilitation

Non-Tariff Measures (NTMs) are those policy tools apart from normal customs duties which have the potential to influence international trade by altering the quantity of goods traded or prices of goods (UNCTAD, 2021). They have some legitimate policy purposes, which include protection of the population's health and safety, security issues, and sustainable development of

products. Nonetheless, their impact on trade depends upon how they are crafted and implemented. While clear, predictable, and proportional processes could be used for achieving legitimate regulatory purposes, ambiguous, cumbersome, and overlapping processes will create additional costs and hamper trade (UNCTAD, 2021). The WTO Trade Facilitation Agreement seeks to increase transparency through the publication of trading processes, risk management, prior-arrival processes, and cooperation among border agencies.

2.3 Police/security checks and customs

Security and police checks are designed to take care of issues like cargo theft, smuggling, criminal behavior, and road safety violations. However, the impact that such checks have on the transport time depends on the number of such checks carried out at various locations, the process of checks, documentation, and the coordination between different enforcement agencies. While such checks have genuine public interest concerns, repetitive checks that involve similar documentation or verification processes could lead to an increase in the stationary period of cargo transportation. The OECD mentions redundant checks, duplicative documentation, and poor inter-agency coordination as some of the reasons behind border delays, as well as poor data exchange. Repeated manual verification or poor coordination can extend clearance time.

Customs controls are also important for collecting revenues, enforcing trade regulations, and verifying cargo declarations. The efficiency of these customs controls is affected by various issues like electronic documents, pre-arrival processing, risk-based inspections, information exchange, and coordination between customs and other border agencies. The Trade Facilitation Agreement of the World Trade Organization encourages customs officials to concentrate their controls on high-risk consignments while releasing low-risk consignments quickly. It also encourages cooperation between border agencies in order to avoid duplications and ensure the movement of goods (WTO, 2014). Thus, the impact of police/security checks and customs controls on corridor transit time is determined not only by the existence of controls, but also by their frequency, duration, sequence, and coordination. Where there is duplication or poor coordination, these controls may lead to increases in non-productive time and delivery schedule uncertainty. On the other hand, risk-based inspections and electronic processing can help to maintain regulatory control without any delay.

2.4 Weighbridges and border-post procedures

Weighbridges are used to enforce axle-load restrictions and protect road infrastructure through the identification of vehicles that exceed weight restrictions. Yet, their impact on the transport of freight depends on the length of the queue, reliability of equipment, weighing process, reweighing and dispute resolution. The World Bank/SSATP study of overload control measures in the region revealed problems such as reweighing, inconsistency in weighing measurements from weighbridges, and lack of clarity in inspection procedures, all of which may lead to delays. This implies that in order to increase the effectiveness of weighbridges, one needs to have reliable and calibrated equipment, sufficient processing capacity, clear enforcement procedures, and acceptance of correct weighing results. Procedures at border posts include the processing of documentation for entering, exiting, and passing through, customs procedures, inspections, and coordination of agencies in neighbouring countries. The purpose of one-stop border posts (OSBPs) is to avoid redundancy, allowing the authorities of neighbouring countries to perform their border clearance procedures in a coordinated location. Studies from East Africa show that one-stop border posts (OSBPs) may help reduce waiting times and transportation costs, but it depends on the successful implementation and coordination. According to Mendez-Parra and Calabrese (2023), there have been decreases in transportation costs and total time spent by transport companies at certain OSBPs, supported by Trade Mark Africa. Nonetheless, shared facilities will not ensure efficiency. Harmonized information systems, procedures, staffing, operating hours, and accountability are crucial factors in avoiding congestion. Moreover, recent monitoring by the East African Community has revealed the delays of multiple approvals by agencies and lack of staff as ongoing operational problems.

3. METHODOLOGY

3.1 Research design

This study adopted a quantitative research design to study the factors that determine the transit time in the selected East African transport corridor. The use of a quantitative research design helped in the systematic analysis of the travel time and transit time and their association with various other factors, such as police and security checkpoints, weighing bridges, customs formalities, and other border post formalities. The use of quantitative research design in the current context was appropriate and justified. Country-specific fields record police/security checks (D01), customs checks (D02), weighbridges (D03), border-post procedures (D06), actual transit time, and total transit time for Kenya, Uganda, Rwanda, Burundi, South Sudan and Tanzania. Some country-

specific values are structural zeros where a truck may not have traversed the jurisdiction or the field may not apply. Such zeros must not automatically be treated as measured zero-hour durations.

3.2 Study area

The study was conducted within the East African Northern Corridor, focusing on the transport corridor from Mombasa in Kenya through to Kampala in Uganda. It should be noted that the Northern Corridor in East and Central Africa provides access to the road routes which connect the coastal areas of Kenya with Uganda and other landlocked nations such as Rwanda, Burundi and South Sudan. The Port of Mombasa represents the key marine port that allows exporting goods to the neighboring lands. The Mombasa-Kampala route has various checkpoints related to road security, traffic control, safety, and customs and border control. Such control points include weighbridges, police checkpoints, and control points of the customs department. The mentioned control points could increase the time of the delivery process and cause some problems for freight transportation. It is for this reason that the route under research was the proper one for conducting the study of the relationship between non-tariff measures and total transit time. This study therefore focused on the road freight movements through this corridor, especially paying close attention to the amount of time spent at the designated stoppage points. The geographical perspective thus allowed for an examination of the impact of administrative processes on freight transport efficiency through the Northern Corridor.

3.3 Data Source

Data used in the analysis were based on primary information obtained from truck drivers and turn boys carrying cargo in the Mombasa–Kampala corridor. Data collection was done through structured questionnaires that focused on obtaining the time taken by trucks at the different stoppages in the corridor. Respondents were supposed to report the time taken in hours for weighbridge check, police check, customs clearance, and border post procedures. Data collection was undertaken through logistics firms, which served as the focal points for contacting respondents and administering the questionnaires. The researcher first visited the selected firms to explain the purpose of the study and arrange the data collection exercise. A drop-and-pick-later approach was subsequently employed because respondents required sufficient time to complete the questionnaires. Upon completion, the questionnaires were returned to the designated offices for collection by the researcher.

3.4 Econometric specification

In order to estimate the connection between the observed total transit time and the transit times corresponding to various regulatory and administrative stoppages, the study utilized OLS regression analysis. Three separate regression analyses were conducted for each of the countries (Kenya, Uganda, and South Sudan). The specification of the econometric model is given below:

$$TT_{ic} = \beta_0 + \beta_1 D01 + \beta_2 D02 + \beta_3 D03 + \beta_4 D04 + \varepsilon_{it}$$

Where;

TT represents the recorded total transit time for a truck in country c, measured in hours; (D01- D04) represent the recorded time associated with police and security checks, customs checks, weighbridges, and border-post procedures, respectively, and the intercept is represented by $\boldsymbol{\beta_0}$, $\boldsymbol{\beta_1 - \beta_6}$ are the estimated regression coefficients. The error term is denoted by $\boldsymbol{\varepsilon}$.

4.1 Descriptive statistics

Table 1: Descriptive statistics

Variable	Country	Mean	Std. Dev.	Minimum	Maximum
Total transit time	Kenya	140.97	22.01	79.74	246.68
	Uganda	103.77	14.05	55.32	178.36
	South Sudan	0.00	0.00	0.00	0.00
Police/security checks (D01)	Kenya	2.16	1.73	0.02	13.62
	Uganda	2.49	1.71	0.10	12.40
	South Sudan	0.31	1.97	0.00	20.40
Customs checks (D02)	Kenya	2.82	3.13	0.03	49.77
	Uganda	3.24	2.57	0.08	26.22
	South Sudan	0.44	2.88	0.00	30.40
Weighbridges (D03)	Kenya	2.98	2.42	0.02	24.00
	Uganda	3.15	2.02	0.03	10.91
	South Sudan	0.27	1.63	0.00	18.90

Border-post procedures (D04)	Kenya	5.05	3.58	0.05	32.02
	Uganda	5.80	5.35	0.17	54.37
	South Sudan	0.51	2.92	0.00	26.22

Source: Author's own compilation from Stata, 2026

From the descriptive statistics, there is an observed variation in the time taken for non-tariff related procedures in Kenya, Uganda and South Sudan. The police and security checks (D01) were observed to have average times of 2.16 hours in Kenya, 2.49 hours in Uganda and 0.31 hours in South Sudan. The customs procedures (D02) had average times of 2.82, 3.24 and 0.44 hours respectively, while weighbridge procedures (D03) had average times of 2.98 hours in Kenya, 3.15 hours in Uganda and 0.27 hours in South Sudan. This indicates that the average time for each of these procedures in Uganda was higher than that in Kenya, while South Sudan had much lower average times.

Border post crossing procedures (D04) had the longest mean time out of the four procedure categories in both Kenya and Uganda, at 5.05 hours and 5.80 hours, respectively. South Sudan had a mean of 0.51 hours for the same procedure category. The standard deviations also point to the variability in the time spent on each procedure category, with Uganda having relatively high variability in the border post crossing procedure category (5.35 hours) compared with Kenya (3.58 hours). It is important, however, to interpret such comparisons between countries with caution, considering that the database shows a zero total transit time for South Sudan for all 390 observations.

4.2 Regression estimates

Table 2: Effect of Non-Tariff Measures on Total Transit Time Along the Northern Corridor

Variables	Kenya	Uganda	South Sudan
Police and security checks (D01)	1.353*** (0.336)	0.880*** (0.113)	0.701 (0.433)
Customs procedures (D02)	1.495*** (0.226)	1.329*** (0.267)	1.365*** (0.304)
Weighbridge procedures (D03)	0.831*** (0.246)	0.997*** (0.143)	0.230 (0.285)
Border-post crossing procedures (D06)	1.204*** (0.184)	1.110*** (0.060)	1.612*** (0.316)
Constant	88.089*** (1.588)	18.435*** (0.787)	20.917*** (6.017)
Observations	384	390	13
R-squared	0.296	0.732	0.966
Adjusted R-squared	0.289	0.729	0.949
Robust F-statistic	34.04	166.20	59.16

Source: Author's own compilation from Stata, 2026

The regression analysis examined the effect of police and security screenings, customs procedures, weighbridge procedures, border post crossing procedures, and total transit time in Kenya, Uganda, and South Sudan. The positive coefficients for most of the explanatory variables indicate that long processing times lead to long total transit times. A number of reasons could account for these findings, such as repeated screenings, document needs, coordination difficulties, and long processing times for cargo and vehicles.

In the case of Kenya, police and security checks have a positive coefficient of 1.353 and are significant at the 1% significance level, implying that an additional hour in security checks results in 1.353 more hours in the total transit time, other things remaining the same. There could be various reasons for this: multiple checkpoints; vehicle checks; enforcement checks; and delays related to coordination between institutions. The biggest coefficient in the Kenyan model is customs procedures, with a value of 1.495, implying that customs-related delays are the strongest estimated contributor to the total transit time among the four considered variables. Reasons for the same could be verification of documents, cargo valuations, compliance checks, and delays in making customs declarations. Weighbridge procedures have a coefficient of 0.831, which may imply the queues; weight verification of vehicles; and time taken to sort out loading and compliance problems. The Border-post Crossing procedures have a coefficient of 1.204. They may imply delays related to immigration and customs procedures; cargo clearance, inspection queues; and delays caused by a lack of information sharing between border agencies. The R-squared of 0.296 implies that 29.6% of the variation in total transit time is explained by factors such as traffic congestion, road conditions, distance, vehicle characteristics, weather, and delays at intermediate stops that are not captured in the specification.

In Uganda, police and security checks, customs procedures, weighbridge procedures, and border-post crossing procedures are said to have positive coefficients and are statistically significant at the 1% level. Customs procedures have a coefficient of 1.329, while border-post crossing procedures have a coefficient of 1.110. Such associations may be because of the period involved in documenting cargo, regulatory compliance, inspections, and coordination of various agencies involved in the corridor. The coefficient of police and security checks is 0.880, and such associations may be due to delays during the checking process and cumulative effects of multiple checkpoints. The coefficient of weighbridge procedures is 0.997, and it may be associated with vehicle queues, axle load verification, and compliance checks. The R-squared of the model in Uganda is 0.732, meaning that the four explanatory variables capture 73.2% of the variation in total transit time. One possible reason for a high value of R-squared could be that the variables included capture more of the sources of variation than the variables included in Kenya. However, differences in measurements, sample inclusion criteria, and transit time distributions may also be another reason behind differences in the models.

For South Sudan, the reported regression results indicate positive coefficients for all four measures, but only customs procedures and border-post crossing procedures are reported as statistically significant at the 1% level. Customs procedures have a coefficient of 1.365, while border-post crossing procedures have the largest coefficient, at 1.612. These results may suggest that customs clearance and border formalities are important correlates of transit time in the reported estimation sample. Possible explanations include documentation requirements, limited coordination between agencies, manual processing, and delays associated with cross-border regulatory procedures. Nevertheless, these explanations should be treated as hypotheses requiring further evidence. The model reports an R-squared of 0.966, suggesting that 96.6% of the observed variation is explained by the included variables. This exceptionally high value should not automatically be interpreted as evidence of superior model performance because the regression is based on only 13 observations. Moreover, the previously examined cleaned dataset reportedly contains zero South Sudan total-transit-time values across all 390 records. This inconsistency must be resolved before the regression estimates or their explanatory power can be relied upon.

Overall, the reported estimates identify customs procedures and border-post crossing procedures as important correlates of total transit time, particularly in Kenya and Uganda. The findings suggest that efforts to reduce transit delays could focus on streamlining documentation, strengthening electronic cargo-processing systems, improving coordination among border agencies, reducing duplicative inspections, and improving the management of queues at weighbridges and checkpoints. In Kenya, further analysis should also consider additional determinants of transit time to establish why the current model explains a relatively small proportion of the observed variation. In Uganda, the relatively high R-squared suggests that the included variables account for a substantial proportion of the observed variation, although the model's specification and diagnostics still require verification.

3.5.1 Test for heteroskedasticity

The test carried out to check the nature of the variance of the errors in the regressions was the Breusch–Pagan heteroskedasticity test, which is a measure of homoskedasticity that, according to Breusch and Pagan (1979), is a statistical test which operates under the assumption that homoskedasticity holds. In the case of Kenya, the Breusch-Pagan test gave $\chi^2(4)$ =1.619, with a p-value of 0.805. With a p-value of 0.805, while for the model Uganda the test gave $\chi^2(4)$ =1.093 with a p-value of 0.895 and South Sudan $\chi^2(4) = 1.873$. Since the p-values are above the threshold of 5%, it implies that the hypothesis of constant error variance could not be rejected for the cases.

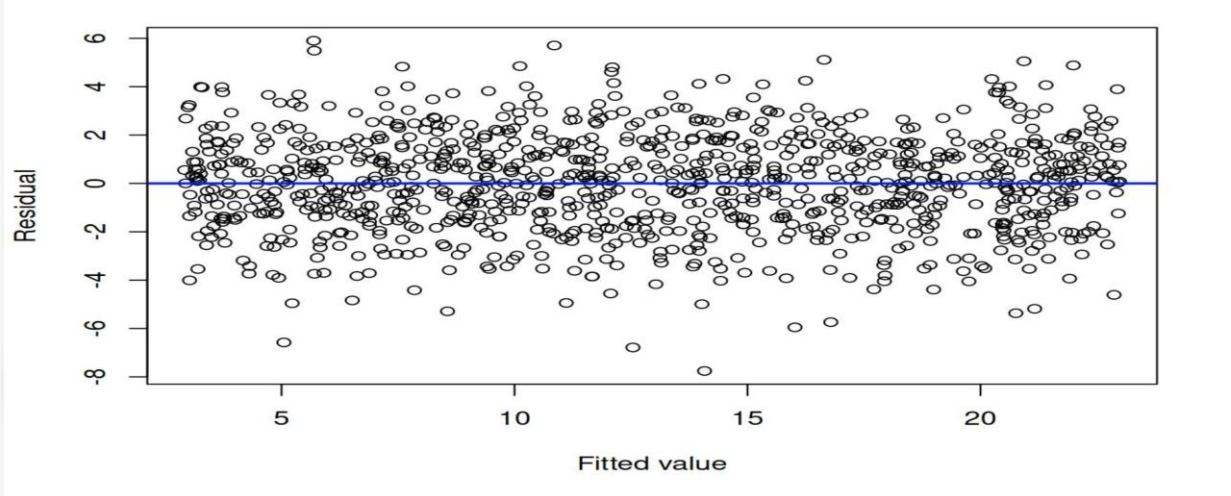


Figure 1: Homoscedastic variance

3.5.2 Testing for Multicollinearity

The problem of multicollinearity was investigated using the Variance Inflation Factor (VIF) method. According to the findings obtained, the maximum VIF for Kenya, Uganda and South Sudan was $1.045, 1.033\ and\ 1.56$, respectively. The values obtained are near unity, implying no strong linear relationships among the explanatory variables in each of the two country models. It, therefore, means that multicollinearity would not have been a problem for the accuracy of the estimates in these models. However, VIFs can only be used as a guide and should not necessarily follow cut-off criteria because the consequences of multicollinearity will always differ from one situation to another in the model (O'Brien, 2007). From the results above, it implies that multicollinearity was not an issue in the Kenya and Uganda regressions.

3.5.3 Ramsey Regression Equation Specification Error Test (RESET)

The Ramsey Regression Equation Specification Error Test (RESET) was performed to check whether the regression models have been specified appropriately. The test tests the hypothesis that the specified regression model does not have any specification errors detectable by the RESET test (Ramsey, 1969). The output revealed that the test was statistically insignificant at the 5% significance level $(p > 0.05)$. It implies that the null hypothesis could not be rejected since the model does not have any functional form misspecifications. The conclusion is that the specified regression model had an appropriate linear functional form according to the RESET test.

Normality of the regression residuals was tested using the Shapiro-Wilk test, which tests the null hypothesis that the residuals are normally distributed. At the 5% significance level, a p-value larger than 0.05 implies that the null hypothesis cannot be rejected, meaning that there is no statistically significant deviation from normality. The Shapiro-Wilk test results showed that the regression residuals were normally distributed because the test did not show any statistical significance at the 5% level $(p > 0.05)$. As a result, the null hypothesis of normality could not be rejected, and it may be assumed that the residuals met the normality assumption of the regression models—however, the inability to reject the null hypothesis indicates normality of the residuals.

3.5.4 Test for Normality

Normality of the regression residuals was tested using the Shapiro-Wilk test, which tests the null hypothesis that the residuals are normally distributed. At the 5% significance level, a p-value larger than 0.05 implies that the null hypothesis cannot be rejected, meaning that there is no statistically significant deviation from normality. The Shapiro-Wilk test results showed that the regression residuals were normally distributed because the test did not show any statistical significance at the 5% level (p>0.05). As a result, the null hypothesis of normality could not be rejected, and it may be assumed that the residuals met the normality assumption of the regression models. However, inability to reject the null hypothesis does not prove normality of the residuals. This is further confirmed by Figure 1 below.

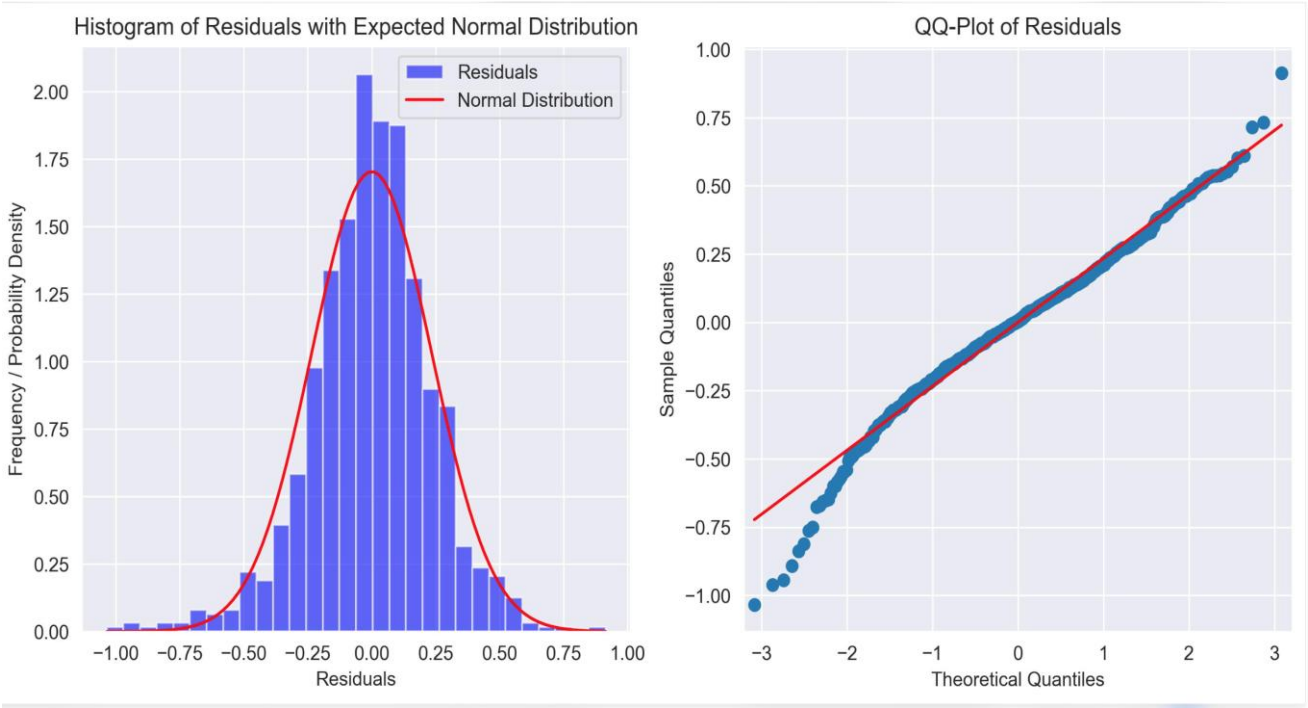


Figure 2: Normality curve

Actionable Policy Recommendations

i. Border agencies should review duplicated document checks and establish joint operating procedures, shared service standards and escalation channels. One-stop border posts should be assessed using queue time, processing time, repeat inspections and the proportion of consignments cleared within published targets, not merely by their physical existence.

ii. Customs administrations and corridor agencies should improve interoperability of electronic cargo declarations, transit guarantees, risk profiles and release notifications. Pre-arrival processing and electronic document exchange can reduce repeated manual handling, supported by reliable systems and transparent exception procedures.

iii. Inspection intensity should be proportionate to assessed risk. Low-risk consignments and compliant operators can be channelled through expedited procedures, while higher-risk consignments receive more intensive checks. Agencies should record the reason, start time, end time and outcome of each stop.

iv. Monitor queue length, equipment uptime, repeat weighing, dispute-resolution time and processing time by vehicle class. Calibrated equipment, transparent procedures, electronic records and recognition of valid weighing results can reduce avoidable delays while retaining axle-load compliance.

v. Adopt a shared data dictionary specifying the start and end points of total transit time, the definition of actual transit time, units, timestamps, country coverage and missing-value codes. A country not traversed must be coded differently from a measured duration of zero. Each record should be traceable to route, direction and journey date while protecting commercial confidentiality.

vi. Publish comparable indicators such as median and 90th-percentile processing time, queue time, share of trucks cleared within service standards, repeat-inspection rates and data completeness. Evaluate reforms with before-and-after data and, where feasible, comparison groups or quasi-experimental methods to distinguish genuine improvements from changes in traffic composition or recording practices.

vii. Reconcile the 390 workbook records with the thesis's reported N = 384; verify the definitions and units of D01, D02, D03, D06, total transit time and actual transit time; and reproduce the reported 5.01- and 5.76-hour border-procedure means. Revise the model to avoid an outcome that mechanically includes its predictors, or explicitly address that identity. Consider route direction, distance, vehicle and cargo attributes, other stops and clustering by route or truck where appropriate.

7. CONCLUSION

This article examined the association between four categories of administrative stop time and country-specific road freight transit time along East Africa's Northern Corridor. In Kenya and Uganda, police/security checks, customs checks, weighbridges and border-post procedures all have positive, statistically significant associations with the recorded total-time outcome; customs checks have the largest coefficient in both countries. South Sudan estimates are based on only 13 observations and are exploratory, while the available fields do not support reliable models for Rwanda, Burundi or Tanzania.

The results underscore the importance of measuring and managing administrative time, but they do not establish causal effects. Potential overlap between stop-time predictors and the total-time outcome, missing controls, and uneven country coverage are substantive limitations. A stronger evidence base requires harmonised definitions, transparent treatment of missing values and reproducible model construction. Policy reforms should combine coordinated border management and digital trade facilitation with stronger data governance and rigorous evaluation.

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Data Availability: Data are available from the corresponding author upon reasonable request, subject to applicable restrictions.

Author Contributions: The authors contributed to the study design, data analysis, interpretation, and manuscript preparation.

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REFERENCES

1) Hummels, D. (2007). Transportation costs and international trade in the second era of globalization. Journal of Economic Perspectives, 21(3), 131–154.
2) Mwango, G. N. (2026). Effect of non-tariff measures on the total transit time of road transportation along East Africa's Northern Corridor [PhD thesis, Moi University].
3) Northern Corridor Transit and Transport Coordination Authority. (2023). 19th edition Northern Corridor Transport Observatory report.
4) Northern Corridor Transit and Transport Coordination Authority. (2024). 20th edition Northern Corridor Transport Observatory report.
5) World Trade Organization. (2017). Trade Facilitation Agreement.
6) World Trade Organization. (n.d.). Trade facilitation.
7) Hummels, D. L., & Schaur, G. (2013). Time as a trade barrier. American Economic Review, 103(7), 2935–2959.
8) Northern Corridor Transit and Transport Coordination Authority. (2025). 20th edition Northern Corridor Transport Observatory report.
9) Hummels, D. (2007). Transportation costs and international trade in the second era of globalization. Journal of Economic Perspectives, 21(3), 131–154.
10) Hummels, D. L., & Schaur, G. (2013). Time as a trade barrier. American Economic Review, 103(7), 2935–2959.
11) Freund, C., & Rocha, N. (2011). What constrains Africa's exports? The World Bank Economic Review, 25(3), 361–386.
12) Limão, N., & Venables, A. J. (2001). Infrastructure, geographical disadvantage, transport costs, and trade. The World Bank Economic Review, 15(3), 451–479.
13) Northern Corridor Transit and Transport Coordination Authority, & Central Corridor Transit Transport Facilitation Agency. (2020). Joint Northern and Central Corridors report.
14) World Trade Organization. (2017). Trade Facilitation Agreement.
15) Djankov, S., Freund, C., & Pham, C. S. (2010). Trading on time. The Review of Economics and Statistics, 92(1), 166–173.
16) Hummels, D. L., & Schaur, G. (2013). Time as a trade barrier. American Economic Review, 103(7), 2935–2959.
17) United Nations Conference on Trade and Development (UNCTAD). (2021). Non-tariff measures from A to Z. United Nations.
18) World Trade Organization (WTO). (2017). Trade facilitation agreement.
19) OECD. (2018). Trade facilitation and the global economy: Border agency cooperation. Organisation for Economic Cooperation and Development.
20) World Trade Organization (WTO). (2014). Agreement on Trade Facilitation, Articles 7 and 8.
21) Mendez-Parra, M., & Calabrese, L. (2023). One-stop border posts in East Africa: Impact on transport costs and issues for further analysis. ODI.
22) Pinard, M. I. (2010). Overload control practices in Eastern and Southern Africa: Main lessons learned (SSATP Working Paper No. 91). Sub-Saharan Africa Transport Policy Program, World Bank.
23) World Bank. (2005). Kenya: Issues in trade logistics. World Bank.
24) East African Community. (2026, July 20). EAC calls for new-generation border reforms to support growing regional trade.
25) Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. Econometrica, 47(5), 1287–1294.
26) O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. Quality & Quantity, 41, 673–690.
27) Ramsey, J. B. (1969). Tests for specification errors in classical linear least-squares regression analysis. Journal of the Royal Statistical Society: Series B (Methodological), 31(2), 350–371.
28) Shapiro, S. S., & Wilk, M. B. (1965). An analysis of variance test for normality (complete samples). Biometrika, 52(3–4), 591–611.

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