Export logistics infrastructure and export competitiveness in the East African Community

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Abstract

Purpose – The purpose of this paper is to examine the influence of export logistics components: shipment arrangements, timely delivery, customs quality, trade infrastructure, and tracking and tracing on export competitiveness of firms in the East African Community (EAC).

Design/methodology/approach – The study adopted the Structural Gravity Model and the Poisson pseudo-maximum likelihood (PPML). PPML a nonlinear estimation method was applied in STATA on a balanced panel data for the period of 2007–2018. Data were obtained from World Bank International Trade Centre (ITC), World Bank Logistics Performance Index (LPI) and World Bank development indicators.

Findings – Results show that timely delivery and tracking and tracing of exports are positive and significant predictors of export competitiveness in EAC countries. Conversely, shipment arrangements, customs quality and trade infrastructure have no influence on export competitiveness.

Research limitations/implications – The results of this study show that export logistics components of shipment arrangements, customs quality and trade infrastructure do not matter at the present in improving export competitiveness in the EAC. There is a need to examine the intricate nature of the EAC economy to further this study's findings.

Practical implications – The EAC partner states should embrace deep integration by removing the behind the border trade barriers in addition to other trade restrictions, to create a common economic space among member states. This will further shrink the delivery time and the tracking and tracing of exports hence improving the competitiveness of EAC exports within the region and outside. Also, common and harmonized trade policies and regulations should be implemented through mutual recognition agreements where countries agree to recognize one another's conformity assessments.

Originality/value – This study explains the complex dynamic interactions of export logistics factors in the EAC using quantitative data and that this interaction has an effect on the export competitiveness in import-dominated countries with less harmonization in their trade policies.

Keywords Export competitiveness, Export logistics infrastructure, Shipment arrangements, Timely delivery, Customs quality, Trade infrastructure, Tracking and tracing, EAC

Paper type Research paper

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1. Introduction

A country's level of export competitiveness is crucial for its effective participation in international trade and eventual management of balance of trade distress (Eberhard-Ruiz and Calabrese, 2018). World over, countries are embracing and implementing international trade policies that are aimed at protecting and promoting local businesses to increase exports and to enable controlled importation of certain products (Han *et al.*, 2015). Precisely, these trade policies simultaneously encompass the aspects of liberalization and protectionism of the implementing economies (Abutabenjeh *et al.*, 2017). Nonetheless, the contemporaneous escalation of globalization, liberalization of trade and financial services, intensification of world trade flows, the emergence of new competitors and increased foreign direct investment have created stiff competition for exporting firms in both domestic and foreign markets (Klaus, 2017). Thereupon, this has increased export competitiveness more so for developing countries and import-dominated countries such as East African Community (EAC) countries. Yet, export-led economic growth is an important avenue of promoting economic growth in developing countries (Hakobyan, 2017).

Export competitiveness is the ability of a country or firm to produce and sell goods and services in foreign markets at a price and quality that ensure long-term viability and sustainability (Gaglio, 2015). It is considered a key indicator of the success of firms through increased export of value-added goods and services (Atkinson, 2013). Indeed, UNCTAD (2020) indicates that there has been a significant increase in the volume of international trade since 2009. However, developing countries are recording more import volumes than export volumes compared to developed countries (UNCTAD, 2020). For example, in 2019, developed countries exported goods amounting to US$10.5tn, and services worth US$4.1tn. Whereas developing countries exported up to US$8.5tn of goods and US$2tn of services (UNCTAD, 2020). The huge variations in exports between developing and developed countries clearly show that the export competitiveness of developing countries is still low which leads to negative balance of payments positions (Arvis *et al.*, 2018).

Uganda, which is a developing country in the EAC, is continually experiencing high levels of export competition in international markets. The stiff competition is shown by the low level of Uganda's earnings from exports compared to the huge payments for imports. That is, Uganda currently has total exports of US$3,087,363,580 compared to US$6,729,436,500 payments on imports which leads to a negative trade balance of US$3,642,072,920 (World Integrated Trade Solution, 2020). This is not different for most of the other EAC and African countries, for instance, Kenya has also registered a deficit trade balance for the decade up to 2020. Kenya's trade deficit in 2020 amounted to nearly 9.4 bn US dollars (World Integrated Trade Solution, 2020). The low levels of exports have been attributed to the dynamic changes and challenges in the trade environment and the increasing international trade costs (Kemitare *et al.*, 2021; Abdallah, 2019; EAC, 2017; Klaus, 2013). Notably, the East African Economic Outlook (2018) indicates that there are low levels of trade facilitation in the EAC in terms of export logistics infrastructure components. The region suffers from high transportation costs, inconvenient lengthy transit time, including documentary processing, highly unpredictable customs clearance time and procedures (East African Economic Outlook, 2018). All these factors are likely to affect the export competitiveness of firms in the EAC.

A critical analysis of the existing studies on export competitiveness shows no study linking the export logistics infrastructure components of shipment arrangements, timely delivery, customs quality, trade infrastructure quality, and tracking and tracing to export competitiveness in a single suite in developing landlocked, and majorly agricultural countries like Uganda, Burundi, Rwanda and South Sudan in the EAC. Indeed, Huo (2014) shows that scholars of export competitiveness in the agricultural sector have rather focused on single country-level factors such as irrigation, exchange rates, the number of agricultural exports, labor cost and domestic consumption. Yet, logistics performance as a whole is a decisive

factor in promoting both the agricultural and other exports for developed economies (Martí *et al.*, 2017). More so, Pascucci (2018) shows that a combination of both external and internal factors can explain the inadequate competitive performance and competitive potential since they have been worsening since the second half of the early 21st century. However, Pascucci only studied Italian companies. Another study by Suwannarat (2017) focused on the export competitiveness of economic products such as cassava, computer equipment and components in Thai without exploring the logistical factors that can promote their competitiveness on the world market.

Further still, Thazhugal Govindan Nair (2020) suggest that to spur economic growth, economic groups are now focusing more on the intra-regional trade and investment liberalization and the potential effects of the same. Hence, there is a need for strong export logistics infrastructure. The few existing empirical studies on export logistics infrastructure components and export competitiveness have been based in developed countries such as those in Europe (EU) (e.g. Puertas *et al.*, 2014) which are predominantly export-minded and with extensively harmonized transport policies (Puertas *et al.*, 2014). The current study explores the phenomenon in EAC countries which present a unique international trade environment. EAC countries are currently more import oriented and they operate on minimally harmonized trade policies. As such, this study will explore whether the findings from other environments match with the EAC countries for a longer period, that is, 12 years more than a study by Puertas *et al.* (2014) which explored the progress made in logistics by the EU Member States over 5 years. In another study by Marti and Puertas (2017) on the importance of export logistics in emerging economies with a maritime border such as Kenya which is in EAC, suggested continuous improvement in logistical infrastructure to boost both their trade and export competitiveness. The current study is also aimed at following up with such recommendations by prior scholars even in non-maritime border countries such as Uganda, Rwanda and Burundi together with maritime countries that as Kenya and Tanzania. Overall, calls for further studies on promoting exports are imminent (Thazhugal Govindan Nair, 2020; Lai *et al.*, 2019; Martí *et al.*, 2017; D'Aleo and Sergi, 2017). Thus, the current study examines the following research questions:

RQ1. What is the effect of shipment arrangements on export competitiveness?

RQ2. How does timely delivery affect export competitiveness?

RQ3. What is the effect of customs clearance on export competitiveness?

RQ4. What is the effect of trade infrastructure on export competitiveness?

RQ5. How do tracking and tracing affect export competitiveness?

The aforementioned research questions were answered by using secondary panel data for a period from 2007 to 2018. The findings indicate that timely delivery and tracking and tracing had a significant and positive effect on export competitiveness in the EAC. The present study results are important in several ways. The study informs policymakers that sustainable improvements in export competitiveness require multifaceted changes in a range of policy dimensions in areas including shipment frequency, timely delivery, trade and trade facilitation and services. This requires concerted efforts and persistent focus of the regional countries. The current study also adds to the already scant existing literature on export competitiveness by providing initial empirical evidence on the contribution of shipment arrangements, timely delivery, customs quality, trade infrastructure quality, and tracking and tracing using evidence from African developing countries (EAC countries).

The rest of this paper is organized as follows. The next section is the literature review and hypotheses development. Next is the methodology section which is then followed by results. The discussion section then follows and finally, a summary and conclusion are provided.

2. Literature review and hypotheses development

2.1 Theoretical foundation

In this study, the New Trade Theory (Krugman, 1979) is used to explore the contribution of export logistics infrastructure on export competitiveness. The New Trade Theory posits that the economies of scale provide an alternative to differences in technology or factor endowments as an explanation of specialization and international trade. The New Trade Theory explains intra-industry trade which contributes greatly to world trade today (Markusen, 2007). The theory explains that producers in different countries while using the same production function compete against the producers of similar products at a level of costs lowered by a larger scale of production. This necessitates countries to form regional integrations to generate more benefits (Schiff and Winters, 2003). The theory seems to offer a reasonable explanation of the export competitiveness of industry through economies of scale, increasing returns to scale, product differentiation and consumer preference for variety where export logistics infrastructure contribute greatly to the export competitiveness of firms. Theoretically, an improvement in logistics infrastructure reduces transaction costs in international trade which increases economies of scale and productivity.

2.2 Export logistics infrastructure

Export logistics infrastructure is a network of services that support the physical movement of goods, trade across borders and trade within borders to increase exports (LPI, 2018). It also involves an array of activities including transportation, warehousing, brokerage, express delivery and terminal and port services (LPI, 2018). Logistics performance is important for competitiveness and ultimately economic growth Puertas Medina *et al.* (2013). Prior studies by Arvis *et al.* (2018) indicate that efficient logistics performance connect firms to markets through reliable supply chain networks. Martí *et al.* (2017) indicate that for all the 26 EU countries, logistics was more important for exporting nations than importing nations in both 2005 and 2010 leading to increased export competitiveness. However, Vilko *et al.* (2011) add that countries with inadequate logistics infrastructure can only grow their exports if that infrastructure is used innovatively, just like the case of Estonia. On the other hand, inefficient logistics raises the transaction costs in international trade and reduces the potential for both international and domestic integration into the global supply chains (LPI, 2018). The Logistics Performance Index (LPI) of the World Bank is analyzed through six indicators; The efficiency of customs and border management clearance, the ease of arranging competitively priced international shipments, the quality of trade and transport-related infrastructure, the competence and quality of logistics services, the ability to track and trace consignments and the frequency with which shipments reach consignees within scheduled or expected delivery time (LPI, 2018). The quality of logistics infrastructure, the distribution of intermodal facilities within countries, the number of logistics operators and their specifications are very important in enhancing export competitiveness and expanding the market share of firms in foreign markets (Bensassi *et al.*, 2015). Since logistics performance has become a decisive consideration in export competitiveness (Puertas Medina *et al.*, 2013), it is plausible to examine the exact contribution of each component of export logistics infrastructure on export competitiveness which is still inadequate in international trade literature. In the proceeding literature, we explain the relationships of each export logistics component with export competitiveness.

2.2.1 Shipment arrangements. Shipment arrangements entail organizing, receiving, recording and sending shipments of goods (Martí *et al.*, 2017). A study by Puertas Medina *et al.* (2013) reveals that international shipments measure how easy it is to arrange shipments at competitive prices. However, these scholars do not find a significant relationship between shipment and international trade flows. A study by UNCTAD (2016) indicates that by trade

facilitation reducing trade costs, prices of consumer goods and firms that import inputs for production decrease, resulting in an increase in real incomes and trade balance. Studies by Eberhard-Ruiz and Calabrese (2018) argue that extra cost of delay, bureaucratic influence, corruption and customs procedures can add up to 15% to the price of goods thereby undermining the export competitiveness of firms. They add that trade facilitation reforms help developing countries to integrate with global value chains, integration into the global logistics networks that will scale up productivity, increase employment opportunities and diversification of exports. Eberhard-Ruiz and Calabrese (2018) add that improvement in trade facilitation across EAC can enhance increased export competitiveness, fostering a better integration of the region's production process to the global value chain. This will result in increased economies of scale and increasing return to scale through reduced average transaction costs. Much as Eberhard-ruiz and Calabrese (2017) agree to this, they argue that the extent to which continued trade facilitation efforts can reduce transport costs depends on the existence of a competitive market structure for the transport sector. Therefore, shipment arrangement involves the preparation of shipping documents, packaging, shipping space and insurance, and dealing with customs requirements (Gani, 2017). By using different packing sizes and styles for ease of handling, results in product differentiation that meets the different demands of consumers. It can be hypothesized that:

H1. Shipment arrangements affect the export competitiveness of EAC countries.

2.2.2 Timely delivery. According to Puertas Medina *et al.* (2013), timeliness is about shipment delivery time punctuality. Indeed, logistics functions have recently shifted from just focusing on the supply but also on space and time relationships due to market globalization and modernization (Puertas Medina *et al.*, 2013). Nordås and Kim (2013) show that the ease with which contracts can be enforced and the time it takes to export and import goods increase the export competitiveness of a firm by reducing the average cost which increases the volume exported. They find that countries in which firms have access to high-quality transport, telecommunication, electricity and financial services tend to do better in terms of export price and their exports tend to be more resilient over time. Therefore, better quality services are important for moving up the value chain in firms for which countries have an advantage (Amador and Cabral, 2014; Nordås and Kim, 2013). Theoretically, this increases the economies of scale and return to scale in the production. UNCTAD (2016) indicates that transport connectivity, the quality of logistics services and efficient border management are major determinants of timely international trade flow. These are ideal for the developing countries to participate in the global value chain, trade in manufactured goods and facilitation foster regional integration. They reduce transaction costs and time spent in all sectors of the economy including perishable and time-sensitive intermediate goods in landlocked countries. Therefore, well-designed trade facilitation measures improve the effectiveness of control agencies by reducing the time required for physical inspection of goods and increasing the timely detection of fraud such as undervaluation, counterfeit trade and smuggling which are common in developing countries. Therefore, we believe that:

H2. Timely delivery affects the export competitiveness of EAC countries.

2.2.3 Customs quality. Customs quality entails the efficiency and effectiveness of the customs clearance procedure in terms of speed, simplicity and predictability of customs agencies (Puertas Medina *et al.*, 2013). To complement the services quality and transportation infrastructure in an ever-changing market environment, port efficiency is very important in improving trade activities through administrative customs activities. Therefore, an improvement in port efficiency results in increased market penetration through reduced transport costs (Micco, 2004; Sánchez *et al.*, 2003). Harmonization of some procedures, data exchanges, unified documentation and mutual recognition of findings allows eliminations of

cost duplication. The simplification and synchronization of trading procedures are the best way of eliminating the complex customs-related cost thereby increasing the volume of which results in increased economies of scale. OECD (2015) explain that for developing countries mostly for manufactured products, harmonization and simplification of documents have the strongest impact on increasing trade flows and competitiveness of firms. Countries can then align their procedures to streamline movements of goods across borders (Spence *et al.*, 2011). For instance, Edwards and Balchin (2008) show that the probability of African firms exporting is enhanced by the possession of an ISO certificate thereby increasing their export competitiveness. Raballand *et al.* (2012) add that the quality and reputation of a particular customs can contribute to the popularity of a port as a basis of increased international trade. By reducing dwell time through structural problems such as rents through customs clearance, poor handling and customs border inefficiencies have long-term positive effects on port operations thus increasing productivity and export competitiveness. Therefore, efficient commodity processing by customs helps firms to increase export competitiveness in international value chains (World Bank, 2009). We, therefore, hypothesize that:

H3. Customs quality affects the export competitiveness of EAC countries.

2.2.4 Trade infrastructure quality. Transport infrastructure encompasses the quality and reliability of a country's transport and telecommunications facilities (Puertas Medina *et al.*, 2013). These are crucial in the export trade of an economy. Nordås and Kim (2013) argue that better services quality improves the export competitiveness of firms through reduced costs and making products that the consumers are willing to pay for. Theoretically, accessibility to efficient, reliable and reasonable transport, distribution, finance, utilities, telecommunication and business services are crucial for the efficient productivity and competitiveness of firms. The services intensity of firms may affect their productivity and thereby their competitiveness in the foreign markets. Services are very instrumental in connecting firms to foreign markets helping them to differentiate their offerings from those of other firms (Lodefalk, 2014). World Trade Organisation (2019) indicates that the effective rate of protection provided by transport costs is higher than that of tariffs. The factors affecting transport cost may include types of products, level of containerization, traffic on some routes, quality of export infrastructure and logistics. The report adds that the difference of these costs across countries is a source of both absolute advantage and comparative advantage which affects the volume and pattern of trade. Hence, the relatively low levels of trade in Africa are due to a lack of appropriate transport infrastructure. Arvis *et al.* (2018) reported that infrastructure affects the economic development of a country in terms of raw materials and final products; hence, a sound infrastructure facilitates the mobility of factors of production which, in turn, improves productivity and reduces costs which are key measures of export competitiveness. Infrastructure increases the flow of information and reduces the market imperfections, which increases economies of scale and return to scale that are enjoyed by the exporters. According to Arvis *et al.* (2018), efficient transportation is an important determinant of export competitiveness as it helps reduce problems of customs delays, incompatible standards, the insufficient flow of information and non-integrated time schedules. Therefore, high transport costs inhibit firm entry into new markets thereby contributing to a high rate of exit of firms from markets reducing their export competitiveness (Nordås and Kim, 2013). We, therefore, hypothesize that:

H4. Trade infrastructure quality affects the export competitiveness of EAC countries.

2.2.5 Tracking and tracing. According to Puertas Medina *et al.* (2013), competence and tracking are crucial in searching for international markets and overcoming the weak domestic demand in EU countries. It measures the tracking and tracing of shipments. According to Wolfmayr *et al.* (2012), there is strong evidence of a positive and robust influence

of services input on a country's relative manufacturing export performance. The study concluded that much as price or cost competition and innovation activities are crucial to the explanation of international trade, market success is driven by service inputs such as good product marketing, efficient distribution and transportation systems among others. He noted a positive and highly significant impact of international service linkages on a country's export market share in manufacturing. Sjolt and Vatne (2012) conclude that services are hybrid in character as integral parts of complex, global systems which are reinforced by the rapid development of information, communication and transport technologies and systems which have eased transaction throughout the production cycle. For example, Durmuşoğlu *et al.* (2012) note that the use of export promotion and services foster the development of individual and organizational capabilities such as capturing market information on time. Hence, firms that use export promotion and services before and after exporting would possess a better grasp of customers' latent needs in foreign markets and perceptive to adopting new technologies which may become a source of enhanced new product development. This is in line with the New Trade Theory which emphasizes product differentiation as a source of consumer satisfaction. We, therefore, hypothesize that:

H5. Tracking and tracing affect the export competitiveness of EAC countries.

3. Methodology

3.1 Study setting

The EAC is an intergovernmental organization comprised of the countries of Burundi, Kenya, Rwanda, Tanzania, South Sudan and Uganda. Since the establishment of the regional block, the partner countries have operationalized the customs union (CU) in 2005 and the common market in 2010 aimed at easing the movement of goods, services, people and capital within the region (EAC, 2017). Following the implementation of the EAC CU, the total volume of trade between the EAC partner countries registered a significant increase (Shinyekwa and Othieno, 2011). In addition, the governments in the region have introduced tools and measures to facilitate trade, improving the trading environment thereby boosting the export competitiveness of firms in the region (The World Bank, 2016). For instance, all the countries put in measures that have simplified the process of starting a business by eliminating the stringent requirements and improving online registrations for firms and other actors. Rwanda removed the mandatory pre-shipment inspection for imported consignments; Uganda has constructed the one-stop border posts (OSBPs) in the majority of the border customs posts, and Tanzania implemented the Tanzania Customs Integrated System (TANCIS) which is an online system for processing customs documents thereby reducing the time taken to clear a consignment for both import and export. Likewise, Uganda implemented ASYCUDA world, an electronic system and Burundi eliminated the cumbersome and costly requirements for pre-shipment inspection that require submission of a clean sheet of findings (The World Bank, 2016). In addition, the EAC countries have several export promotion tools in common that include duty drawback, manufacturing under bond and export processing zones (EPZs) among others, with a view of increasing export competitiveness since goods benefiting from these schemes are primarily destined for export.

Exports in the EAC expanded mostly in the early 2000s. The export share in the total gross domestic product (GDP) increased from 13% in 2000 to 18% in 2015. In the same period, imports on the other hand expanded from 21% to 28% creating a high trade deficit in the region (UNIDO, 2018). Tanzania, Rwanda and Uganda experienced a relatively high increase in the merchandise export as compared to Burundi and Kenya whose merchandise export was reduced (UNIDO, 2018). The merchandise export in the region has been dominated by the primary products and to some extent resource-based manufactures. The role of EAC in intra-

regional trade has been significant although trade is still dominated by countries outside the region such as the EU and Asian countries. While the primary products continue to dominate the markets of the EU and Asia, the imports from these markets are mainly high value-added manufactures. This reflects the inadequate efforts of structural transformation in the region lowering the export competitiveness of firms (UNIDO, 2018).

3.2 Research design and data source

This study used secondary panel data for indicators of competitiveness for a period from 2007 to 2018 because there is already an existing body of data on the variables under study. Specifically, the researcher obtained the data for the EAC exports from the World Bank International Trade Centre (ITC). Data on export logistics infrastructure were got from the experts and professionals through a survey of the World Bank LPI (LPI, 2018). The use of panel data was to enable control for variables that may not be observed or measured over time like differences in business practices across firms (Hsiao, 2014). Panel data brings out the relationship between the variables under study and it accounts for individual firm heterogeneity to minimize the unobserved and endogeneity bias (Baltagi, 2014). It helps make inferences about the causal relationship between variables in real-world practices as it can determine the direction of the causal relationships. It is suited to the studies of dynamic changes in the economy such as export competitiveness (Hsiao, 2014). This is because export competitiveness is dynamic in nature that requires panel data analysis to make more accurate inferences and predict the export potential of firms in the EAC. The study was descriptive mainly focusing on the quantitative aspect of the study that involved obtaining information and making statistical explanations about the situation that exist (Dawson, 2002; Kumar, 2014; Neuman, 2012).

3.3 Model specification and variable measurement

The study adopted with modifications the structural gravity model as used by Anderson and Van Wincoop (2004) to explain the effects of trade costs on the pattern of trade across countries. This model was adopted because it is relevant when making inferences on the portion of trade costs of firms or countries that cannot be directly measured in the data and the interactions between countries that are not direct trade partners (Anderson, 2010, 2011, 2014). In the current study, we have incorporated trade costs in terms of distance, contingency, common language, common colony, transport cost for exports, transport cost for imports, tariffs, GDP for importing country, GDP for exporting country and real exchange rate to explain export competitiveness in EAC counties. These trade costs are conceptualized as control variables since Bartov *et al.* (2000) suggest that inability to provide for confounding factors can lead to falsely rejecting the hypotheses when in fact they should be accepted. The predictor variables in the model are derived from the export logistics index (African Export-Import Bank, 2018), and they are shipment arrangements, timely delivery, customs quality, trade infrastructure, and tracking and tracing. The mathematical expression of the derived model is as follows:

$$\begin{aligned} \mathrm{EC} = {} & \beta 0 + \beta 1\mathrm{TT} + \beta 2\mathrm{CC} + \beta 3\mathrm{TD} + \beta 4\mathrm{TI} + \beta 5\mathrm{SA} + \beta 6\mathrm{Dist} + \beta 7\mathrm{Contig} + \beta 8\mathrm{Comlang} \\ & + \beta 9\mathrm{ComCol} + \beta 10\mathrm{TCE} + \beta 11\mathrm{TCI} + \beta 12\mathrm{Tari} + \beta 13\mathrm{GDPM} + \beta 14\mathrm{GDPE} \\ & + \beta 15\mathrm{REER} + \varepsilon j \end{aligned}$$

where EC is export competitiveness; TT is tracking and tracing; CC is customs clearance; TD is timely delivery; TI is trade infrastructure; SA is shipment arrangements; Dist is distance; Contig is Common border; Comlang is common language; ComCol is common colony; TCE is

transport cost export; TCI is transport cost import; Tari is the import tariff; GDPM is the GDP for the importing country; GDPE is the GDP for the exporting country; REER is the real exchange rate and ϵj is the error term.

The components of export logistics infrastructure were measured in accordance with the World Bank LPI (African Export-Import Bank, 2018). The scores of the index range between 1 and 5 with the highest score representing better performance. The LPI represents survey data from logistics professionals who provide answers concerning their experience in the various fields (World Bank, 2014).

The Poisson pseudo-maximum likelihood (PPML), a nonlinear estimation method, was also adopted to account for heteroskedasticity, fixed and random effects and the possible loss of information due to zero trade flows, thereby producing robust results. Since the components of the variables were measured in different units, the observations were normalized or standardized to permit averaging, with the average regarded as a composite index. The normalization used in this study was the min–max formula, which adjusts the normalized components to take values between 0 and 100 over the indicated period. The min–max technique gives a linear transformation on the original range of data. It keeps the relationship among the original data, and it fits the data in a predetermined boundary (Vafaei *et al.*, 2018).

4. Results

4.1 Normality, multicollinearity and diagnostic test for model specification

We tested for normality by both the graphical and numerical using the kernel density, quantile–quantile plot (Q–Q plot) and Jarque–Bera test. The kernel density is a better estimator than the histogram, which allows the estimated function to be smooth as well as to figure out a more detailed structure due to its statistical accuracy (Travis *et al.*, 2016; Goedele *et al.*, 2013). The results in Figure 1 depict a fairly bell-shaped distribution of export competitiveness. Therefore, the data were normally distributed and the application of the parametric tests are appropriate for this study. The Q–Q plot was used to estimate the variations in terms of export competitiveness under the normal distribution of the data as

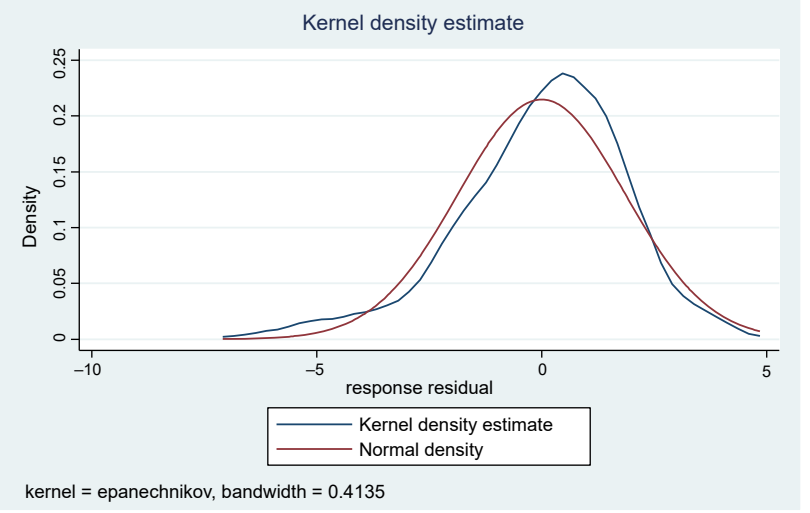

Figure 1.
Normality distribution

shown in Figure 2. The results show that the plots approximately lie on the straight line suggesting a linear and normal distribution.

We also applied the Jarque–Bera test (See Table 1) which is theoretical and the skewness–kurtosis test (empirical) to test for normality. Jarque–Bera test is a goodness-of-fit test to estimate whether the data have the skewness and kurtosis matching a normal distribution. The skewness of the data is 0.033 and the kurtosis is 0.472 based on excess kurtosis determination. Both values are close to 0 as you would expect for a normal distribution. Therefore, this is an indication that the data are normally distributed.

To establish the degree of multicollinearity between the predictor (independent) variables we used the variance inflation factor (VIF) values. The rule of thumb is that if any of the VIF values exceed 10, it implies that the associated regression coefficients are poorly estimated due to multicollinearity (Kumar, 2014). Therefore, none of the VIF values were up to 10, and the mean VIF of the model was less than 10 as shown in Table 2. It means there was no collinearity in the model.

Additionally, we carried out the logistics regression diagnostic test for model specification using a Link Test in line with Murteira and Ramalho (2014), Torres-Reyna (2007). The idea behind the Link Test is that if the model is properly specified, there should not be any additional predictors that are statistically significant. The Link Test uses the linear predicted value (-hat) and the linear predicted value squared (-hatsq) as the predictors to rebuild the model (Torres-Reyna, 2007). The variable (–hat) should be statistically significant as expected since it is the predicted value from the model unless it is completely misspecified. On the other hand, the variable (-hatsq) should not have much predictive power, and it should not be significant unless some relevant variables have been omitted from the model (Murteira and Ramalho, 2014). The results in Table 3 show that the predicted value of (−hatsq) was not

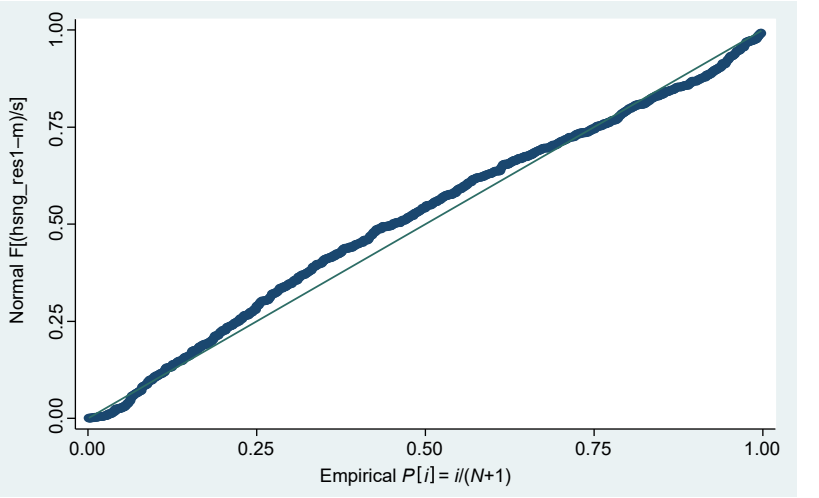

Figure 2.
Showing the Q–Q plot

Table 1.
The Jarque–Bera test its competitors for testing normality

Variable	Pr(Skewness)	Pr(Kurtosis)	adj $\chi^2(2)$	Prob > χ^2
Export competitiveness	0.0052	0.0000	21.71	0.0000

Source(s): Own analysis

Variable	VIF	1/VIF
Distance	2.09	0.4790
Contingency	2.1	0.4769
Common language	1.26	0.7951
Common colony	1.44	0.6966
Transport cost exp	2.05	0.4871
Transport cost imp	1.54	0.6481
Tariff	1.41	0.7078
GDP import	1.28	0.7836
GDP export	1.73	0.5789
Real exchange rate	1.14	0.8754
Tracking and tracing	1.68	0.5954
Customs clearance	2.11	0.4748
Timely delivery	2.65	0.3768
Trade infrastructure	1.74	0.5759
Shipment arrangements	1.37	0.7310
Mean VIF	*1.67*	

Source(s): Own analysis

Table 2. Variation inflation factor (VIF)

Export competitiveness	Coef	Std. Err.	$p > t$	(95% Conf. Interval)	
_hat	1.2145	0.6253	0.052	−0.0109	2.4401
_hatsq	−0.0497	0.1408	0.724	−0.3257	0.2264
_cons	−0.2297	0.6912	0.740	−1.5844	1.1250

Source(s): Own analysis

Table 3. Link test

significant as expected with a p-value of 0.724, meaning that the model had no specification errors and the variable (−hat) was significant since the p-value of 0.052 which is close to 0.05. We conclude that all the necessary variables were included in the model implying that we did not exclude any important variables that should be in this model.

4.2 Descriptive statistics

Table 4 displays the descriptive statistics for all constructs. The mean and standard deviation together with the minimum and maximum statistical results were generated to summarize the observed data. This was necessary because the means represent a summary of data while the standard deviation indicates how well the means represent data. Looking at the export competitiveness with a mean of 9.25509, minimum value of 0 and maximum value of 14.04235 imply that most firms in the EAC are fairly competitive in foreign markets. The coefficient of variation was used to determine the degree of variability in the data. The lower the value of the coefficient of variation, the more precise the estimates are, while the higher the value, the greater the level of dispersion.

The results indicate that there was the highest variability in timely delivery. This great variance creates an unpredictable trade environment which affects the export competitiveness of firms. Low variability was revealed in tracking and tracing, frequency of shipments, trade infrastructure and customs clearance. This is a reflection of what is happening in export trade in the EAC. Low variability would imply that export logistics infrastructure is important in determining the export competitiveness of firms in the EAC.

Variable	Mean	Std. Dev.	Min	Max
Export competitiveness	9.25509	2.61321	0.00000	14.04235
Distance	8.34300	0.89213	5.19299	9.450084
Contingency	0.13772	0.34470	0.00000	1.00000
Common language	0.40719	0.49144	0.00000	1.00000
Common colony	0.22156	0.41541	0.00000	1.00000
Transport cost exp	2.86550	0.78316	0.25580	4.00187
Transport cost imp	3.94444	0.26840	3.51337	4.40023
Tariff	2.17545	1.35458	−0.38566	4.78749
GDP import	3.37234	0.20202	2.79923	3.65901
GDP export	2.66393	0.43085	1.85585	3.18966
Real exchange rate	4.63816	0.10982	4.45177	4.86597
Tracking and trace	0.86456	0.23201	0.00000	1.09861
Customs clearance	0.79909	0.17819	0.69315	1.09861
Timely delivery	0.97696	0.27868	0.0000	1.38629
Trade infrastructure	0.81543	0.18614	0.69315	1.09861
Shipment arrangements	0.88760	0.20262	0.69315	1.09861

Source(s): Own analysis

Table 4. Descriptive statistics of the study variables

4.3 Correlation results

Pearson's correlation analysis was conducted to measure the strength of linear associations between independent and the study variables (Table 5). The study variables were measured on a continuous scale, and thus Pearson pairwise correlation was found to be the most appropriate to test the relationships between export competitiveness and independent variables. Therefore, the results indicate that low and moderate for most of the variables between the export competitiveness and independent variables. At this level of analysis, shipment arrangements, trade infrastructure and customs quality are significantly and negatively related to export competitiveness ($r = -0.0370$**, $r = -0.2431$** and $r = -0.1665$**, respectively, at $p < 0.01$). Timely delivery has a significant positive relationship with export competitiveness ($r = 0.1374$** and $p < 0.01$). Tracking and tracing also have a significant positive relationship with export competitiveness ($r = 0.1103$** and $p < 0.01$).

4.4 Regression results

Results in Table 6 show that shipment arrangements, timely delivery, customs quality, trade infrastructure and tracking and tracing predict 44.9% of the variance in export competitiveness (R-squared = 0.449). Tracking and tracing with $\beta = 0.06791$** and timely delivery with $\beta = 0.29347$** are the only export logistics components that positively and significantly contribute to export competitiveness in EAC. At this level of analysis, shipment arrangements, customs quality and trade infrastructure have a significant and negative variation with export competitiveness in EAC. These results were obtained from secondary panel data for a period from 2007 to 2018 for indicators of export competitiveness.

The results further reveal that the overall time required to transport goods along the main transport corridors that link the ports of Dar es Salaam and Mombasa has been reduced due to the improvement of transport infrastructure. A survey by Calabrese and Eberhard-ruiz (2017) indicates that a single customs territory (SCT) was implemented to speed up the clearance of goods at the entry ports. In addition, non-Tariff barriers (NTBs) have been reduced and several OSBPs were established to reduce the border crossing time. Also, the number of weighbridges were reduced which have resulted in the reduction in days taken to deliver containers, for instance, from 20 days to 10 days between Mombasa and Kampala. The EAC Doing Business Report (2019) shows that all the EAC states have managed to

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Export competitiveness (1)	1.000															
Distance (2)	−0.184**	1.000														
Contingency (3)	0.256**	−0.691**	1.000													
Common language (4)	0.049	−0.288**	0.270*	1.000												
Common colony (5)	0.187*	−0.381*	0.414*	0.350	1.000											
Transport cost exp (6)	0.298*	−0.011	0.006*	0.000	0.104*	1.000										
Transport cost imp (7)	−0.463*	−0.010	−0.042	0.079*	−0.181*	−0.555*	1.000									
Tariff (8)	0.124*	0.053*	0.075*	−0.039*	0.110*	0.071*	−0.299*	1.000								
GDP imp (9)	−0.010	−0.016	−0.019	0.041	−0.014	0.039	−0.087*	−0.110*	1.000							
GDP exp (10)	0.524*	0.022	0.072*	0.038	0.233*	0.213*	−0.389*	0.167*	0.209*	1.000						
Real exchange rate (11)	0.012	0.005	0.003	0.009	0.005	−0.039	0.167*	−0.182*	−0.261*	−0.003	1.000					
Tracking andtracing (12)	0.110*	0.012	0.022	−0.005	0.065*	0.161*	−0.118*	0.207*	−0.147*	0.116*	0.009	1.000				
Customs clearance (13)	−0.166*	−0.005	−0.022	0.004	−0.064*	−0.020	0.190*	−0.035	0.033	−0.207*	0.019	0.260*	1.000			
Timely delivery (14)	0.137*	0.001	0.023	−0.028	0.081*	0.188*	−0.193*	0.225*	−0.049*	0.149*	−0.066*	0.586*	0.546*	1.000		
Trade and transport (15)	−0.243*	−0.017	−0.042	−0.021	−0.108*	−0.100*	0.229*	−0.123*	−0.127*	−0.443*	0.034	0.246*	0.497*	0.191*		
Shipment arrangements (16)	−0.037	−0.002	0.015	0.003	−0.006	0.106*	−0.094*	0.214*	−0.159*	−0.137*	−0.033	0.234*	0.285*	0.435*	0.205*	1.000

Note(s): *, **indicate that correlation is significant at the 0.05 and 0.01 levels, respectively (two-tailed)

Source(s): Own analysis

Table 5.
Correlation analysis results

Variables	Coef	Robust Std. Err.	$p > z$	(95% Conf. Interval)	
Distance	−0.01237	0.00903	0.171	−0.03006	0.00533
Contingency	0.15398	0.02119	0.000	0.11245	0.19550
Common language	−0.02080	0.01463	0.155	−0.04949	0.00788
Common colony	0.03235	0.01527	0.034	0.00243	0.06227
Transport cost exp	0.01683	0.00780	0.031	0.00154	0.03212
Transport cost imp	−0.31999	0.03423	0.000	−0.38707	−0.25291
Tariff	−0.01736	0.00371	0.000	−0.02463	−0.01010
GDP import	−0.11692	0.08172	0.153	−0.27710	0.04325
GDP export	0.35528	0.02005	0.000	0.31598	0.39458
Real exchange rate	−0.29876	0.19245	0.121	−0.67596	0.07844
Tracking and trace	0.06791	0.03539	0.055	−0.00145	0.13728
Customs clearance	−0.33444	0.05469	0.000	−0.44162	−0.22726
Timely delivery	0.29347	0.03586	0.000	0.22318	0.36376
Trade infrastructure	−0.28823	0.04588	0.000	−0.37815	−0.19832
Shipment arrangements	−0.11479	0.03238	0.000	−0.17825	−0.05133
_cons	2.54932	0.08969	0.000	2.37352	2.72511
R-squared = 0.449					

Source(s): Own analysis

Table 6. Regression analysis results

reduce the time needed to export and import by developing and implementing the electronic document submission and processing certificate of origin, allowing faster delivery of consignments and reduction in trade costs. For example, Uganda reduced the time for export documentary compliance and border compliance by allowing for electronic document submission and processing of certificates of origin and by further developing the Malaba OSBP. Rwanda made trading across borders easier by removing the mandatory pre-shipment inspection for imported products. Tanzania made trading across borders easier by upgrading infrastructure at the port of Dar es Salaam. Kenya speeded up trade by implementing an electronic cargo tracking system and linking this system to the Kenya Revenue Authority's electronic data interchange system for customs clearance. Burundi made trading across borders easier by eliminating the requirement for a pre-shipment inspection clean report of findings.

Results further show that the ability to track and trace consignments has a positive and significant impact on the export competitiveness of goods in the EAC over the period under study. This means that an improvement in the ability to track and trace consignments by a unit will lead to an increase of export competitiveness by about 0.06791 of export firms in the EAC. The export firms will become more productive and competitive when the ability to track and trace consignments improves. Overall, the results suggest that export firms will be more competitive in the foreign markets when they can track and trace the consignments.

The results also show that customs clearance is negatively and statistically significant with a p-value is less than 0.05 ($p = 0.000$) and a coefficient of −0.33444 supporting the hypothesis. This shows that an improvement in customs clearance by a unit will lead to a decrease of export competitiveness by about 0.33444 of export firms in the EAC. The export firms will become less productive and competitive when the efficiency of customs clearance improves. This could imply that as the customs clearance improves, some restrictions and regulations are put in place that may reduce the competitiveness of firms in the EAC. It could also necessitate training of staff by the export firms and clearing companies to cope with the changes, increasing the costs of doing business. Contrary to the prior expectation, the findings suggest that customs quality does not affect the export competitiveness of export of fish in the EAC. Hence, the result does not support the hypothesis.

Further still, shipment arrangements are negatively and statistically significant with a p-value is less than 0.000 ($p = 0.000$) and a coefficient of −0.11479 supporting the hypothesis. This shows that an improvement in shipment arrangement by a unit will lead to a decrease of export competitiveness by about 0.11479 of export firms in the EAC. The export firms will become less productive and competitive when the efficiency of shipment arrangements improve. This could imply that for the shipment arrangements to improve, expertise and skills are required and also costs increase that may reduce the competitiveness of firms in the EAC. This could necessitate training of staff or hiring expert companies by the export firms and shipping companies to cope with the changes, increasing the costs of doing business and reducing export competitiveness of firms.

Lastly, trade infrastructure quality is negatively and statistically significant with a p-value is less than 0.000 ($p = 0.000$) and a coefficient of −0.28823 supporting the hypothesis. This shows that an improvement in trade infrastructure quality by a unit will lead to a decrease of export competitiveness by about 0.28823 of export firms in the EAC. The export firms will become less productive and competitive when the efficiency of trade-related infrastructure improve. This could imply that as the trade-related infrastructure such as transport and warehousing among others improve, some restrictions and regulations such as road tolls and axle load limitations are put in place that may reduce the competitiveness of firms in the EAC. These increase the transaction cost by increasing the costs of warehousing, reducing the export competitiveness of firms in the EAC. It may also require increased use of ICT facilities and energy that involve increased connectivity and operation costs.

5. Discussion

This research explored and tested the contribution of shipment arrangements, timely delivery, customs quality, trade infrastructure, and tracking and tracing on export competitiveness. From results in Section 4.4, export logistics components of timely delivery and tracking and tracing have a positive and significant impact on export competitiveness of goods in the EAC over the period under study. As such, the proceeding discussion confirms that the frequency with which shipments reach the consignees within the scheduled or expected delivery time increases the competitiveness of goods exported by firms in EAC. Also, the results show that an improvement in the ability to track and trace consignments leads to an increase in the export competitiveness of export firms in the EAC.

Timely delivery of goods or consignments is very important in international trade for it reduces the transactions costs and meets the demands of the consumers which increase confidence by the consumers in the market. This also helps the exporting firms to adapt very quickly to the changes in consumer demands. Thus, it implies that firms in EAC have improved on the efficiency and speed at which they deliver commodities to markets both domestic and foreign. This finding is in agreement with Hoekman and Shepherd (2015) who found that an extra day's delay is associated with a reduction in bilateral trade of at least 1%. This is also consistent with Eberhard-Ruiz and Calabrese (2018) who show that extra cost of delay, bureaucratic influence, corruption and customs procedures can add up to 15% to the price of goods thereby undermining the export competitiveness of firms. The findings also align with the findings of the previous studies such as those by Puertas Medina *et al.* (2013), Nordas and Kim (2013) and Amador and Cabral (2014). Thus, timely delivery means that firms and consumers can access a wider variety and volume of the goods as the fixed cost of transporting the products into the foreign markets reduces. The findings support the New Trade Theory (Krugman, 1979) and emphasize increasing economies of scale and product differentiation, leading to consumer satisfaction.

Improvement in the ability to track and trace consignments leads to an increase in the export competitiveness of export firms in the EAC. The export firms become more productive

and competitive when the ability to track and trace consignments improves. This could imply that the ability to track and trace consignment is dependent on the application of modern technology which is efficient that reduces the cost of the transactions which may result in increased export competitiveness of firms in the EAC. Because the tracking and tracing process may require the use of electronic devices such as cargo scanners that could be able to monitor the movement of the consignments across borders and between countries. This is consistent with ITC (2018) which argues that most developing countries have access to information and communication technologies (ICTs) through the adoption is still limited by various constraints including skills gaps and the high cost of online access. This is also consistent with the previous studies such as Puertas Medina *et al.* (2013), Wolfmayr *et al.* (2012), Sjolt and Vatne (2012) and Durmuşoğlu *et al.* (2012). This may reduce the number of exporters which results in reduced productivity of the export firms. The security of cargo between the points of exit and destination is a major concern for shippers in international transportation. To have the security of their cargo ascertained and guaranteed at every transit point, the cargo owners use various tracking and tracing mechanisms such as phone communications and electronic systems. The electronic tracking system is very vital in that it controls the level of diversion of cargo as well as reduces the time taken to clear the cargo at the border, and it increases the rate at which duties are collected. This is supported by UNCTAD (2016) which indicates that transport connectivity, the quality of logistics services and efficient border management are major determinants of international trade flow. The findings support the New Trade Theory (Krugman, 1979) which posits that increasing economies of scale and increasing return to scale due to reduced transaction costs facilitate international trade flows.

Export firms will become less productive and competitive when the efficiency of customs clearance improves. This could imply that as the customs clearance improves, some restrictions and regulations are put in place that may reduce the competitiveness of firms in the EAC. This is because a majority of the exporters employ the services of clearing agents whereby an improvement of the quality of the custom may reduce the number of agents. This means that the exporters who entirely rely on the agents for their exportation activities may reduce the exportation as they learn the procedures. It may also be that an improvement in the quality of the custom may come with increased requirements and standards that the ordinary exporters may not be able to meet such as the use of electric devices. In addition, customs procedures are carried out by licensed customs clearing agents who pay $100 application fees and $400 annual fees. These fees increase the average trade costs which increase the marginal cost of production, reduce profits and productivity, resulting in reduced export competitiveness. All the governments in the EAC have introduced tools to facilitate faster clearance of goods through customs. This is supported by ITC (2018) which shows that ICTs have been widely used in customs management which has made customs clearance to become faster and more efficient. In addition, E-customs has made coordinated customs clearance possible and facilitated a series of regulatory reforms such as fast customs clearance and transit, fast-track customs clearance channels for high-tech companies, online supervision of processing trade and paperless customs clearance. This is also consistent with Hoekman and Shepherd (2015) who found that firms of all sizes benefit from improved trade facilitation by exporting more in response to the improvement in the reduction of time taken to export. However, this is contrary to Raballand *et al.* (2012) who suggest that the quality and reputation of a particular customs can contribute to the popularity of a port as a basis of increased international trade. This contradiction may be because the customs procedures and documentation are not yet fully harmonized within the EAC. The use of different systems is potentially a source of delays in cargo clearance which increases the transaction cost thereby reducing export competitiveness. The findings support the New Trade Theory (Krugman, 1979) which is based on monopolistic competition where some firms may not enter the market due to some restrictions.

The results also indicate that shipment arrangements have a negative and significant impact on the export competitiveness of firms in EAC. This implies that when firms arrange competitively priced international shipments, the transaction cost of transportation and cargo handling will increase leading to a reduction in export competitiveness of firms. This suggests that the export firms will be less competitive in the foreign markets when the shipment arrangements of exports improve. The ease with which firms arrange competitively the priced international shipments through the customs authorities and border agencies is very important for the exportation of goods in EAC. This could imply that effective shipment arrangements may require the adoption of modern technology, which may be expensive to install and operate. Much as all the governments in the EAC have introduced tools to facilitate faster clearance of goods through the customs, they are not yet fully harmonized. This is consistent with Puertas Medina *et al.* (2013) who did not find a significant relationship between shipment arrangements and international trade flows. It is also in line with ITC (2018) that argue that trade facilitation was not adequately equipped to detect and tackle corruption directly using the ICT systems. In most cases, it takes time to verify compliance records of the exporters with customs to determine if firms have a trustworthy system in managing records. The consignees need a high degree of certainty concerning their deliveries in terms of time when they will be delivered and how they reach the final destinations. This is supported by LPI (2018) which shows that the low performing countries on export logistics fail to meet the criteria of reliability and quality services. This is also consistent with Hoekman and Shepherd (2015) who found that firms of all sizes benefit from improved trade facilitation by exporting more in response to the improvement in the reduction of time taken to export. However, the results are inconsistent with the findings of previous studies such as Eberhard-Ruiz and Calabrese (2018) who suggest that improvement in trade facilitation across EAC can enhance increased export competitiveness, fostering a better integration of the region's production process to the global value chain. This could be due to the current EAC LPI ranking position which shows that all EAC LPI rankings are low. Theoretically, this study confirms the assumption of the New Trade Theory that majority of the world trade takes place between countries that are similar in terms of development, structure and factor endowments. As such, shipment arrangement may not be very big influencers of export competitiveness.

The results further suggest that the export firms will be less competitive in the foreign markets when the trade and transport-related infrastructure of exports become more efficient and reliable. Firms will be less competitive and less productive when trade and transport-related infrastructure become more efficient, reliable and faster to access the foreign markets. This is because the average export costs will increase, reducing the consumer's demands due to the reduced quantity exported. This could imply that as the trade-related infrastructure such as transport and warehousing among others improve, some restrictions and regulations such as road tolls, axle load limitations are put in place that may reduce the competitiveness of firms in the EAC. These increase the transaction cost by increasing the costs of warehousing, reducing the export competitiveness of firms in the EAC. It may also require increased use of ICT facilities and energy that involve increased connectivity and operation costs. This is supported by literature such as Mbekeani (2007) who shows that weak infrastructure is a major limitation to trade, export competitiveness and sustainability of economic development. He indicates that transport costs are important barriers to international trade resulting in a reduction of export volume. The findings align with the findings of other studies such as Puertas Medina *et al.* (2013), Nordas and Kim (2013), Amador and Cabral (2014) and Lodefalk (2014). On their part, Arvis *et al.* (2018) reported that infrastructure affects the economic development of a country in terms of raw materials and final products; hence, a sound infrastructure facilitates the mobility of factors of production which, in turn, improves productivity and reduces costs which are key measures of export

competitiveness. This is consistent with Nalule (2016) who show that the EAC states are struggling with the challenges of accessing modern energy especially electricity. The findings support the New Trade Theory (Krugman, 1979) which is based on monopolistic competition where some firms may not enter the market due to some restrictions, thus reducing productivity and export competitiveness.

6. Conclusion and implications

This study was conducted to investigate the effect of export logistics components on the export competitiveness of firms in the EAC. This study was motivated by the low level of export competitiveness of export firms in EAC partner states especially for manufactured goods due to the low levels of product transformation and poor or lack of value addition. Also, there is scanty literature on improving exports in import-oriented countries like those in the EAC since current studies have been conducted in export minded countries such as those in EU (Puertas *et al.*, 2014; Martí *et al.*, 2017). To achieve the purpose of the study, five hypotheses were stated and tested. The study adopted the structural gravity model and employed the PPML estimation method, a nonlinear estimation method on a balanced panel data of export firms in the EAC between 2007 and 2018. The study provides evidence that export logistics components that include customs quality, shipment arrangements, timely delivery, trade infrastructure quality, tracing and tracking in the exporting country have an impact on the export competitiveness of firms in the EAC. An improvement in logistics infrastructure reduces the average trade costs and increases economies of scale. Specifically, results show that timely delivery and tracking and tracing of exports are positive and significant predictors of export competitiveness whereas shipment arrangements, customs quality and trade infrastructure do not influence export competitiveness in the EAC.

This study contributes to academic research by providing empirical evidence to support the theories that are relevant to explain the export competitiveness, but also it has implications for a larger body of knowledge which could benefit other related studies. While the New Trade Theory emphasizes increasing economies of scale, increasing return to scale, product differentiation and consumer preference for variety. This study develops a model that integrates the five-export logistics on export competitiveness. The study makes a contribution to the growing body of literature and debates on the concept of competitiveness by bringing out how the export logistics infrastructure interact and contribute to the New Trade Theory by reducing the transaction costs, resulting in increasing economies of scale. These interactions link with global markets to increase productivity and export competitiveness. For the first time, this study has explained the complex dynamic interactions of these factors in the EAC using the quantitative data and that this interaction affects the export competitiveness.

The findings of this study have several managerial and policy implications to the exporters and their associations, export firms, transporters, government agencies and the governments of partner states. For policy purposes, these results imply that the trade between EAC countries and other trade partners need to be enhanced through improvement in the timely delivery and tracking and tracing facilitation to improve on the export competitiveness. In addition, the EAC partner states need to take deeper reforms as regard logistics infrastructure to enable firms to integrate into the global value chains (GVCs) to enable them to increase their productivity by reviewing the existing policies to match the changes in the market. The EAC partner states need to embrace deep integration by removing the behind the border trade barriers in addition to other trade restrictions, to create a common economic space among member states. This helps the implementation of common and harmonized economic policies and regulations since it involves mutual recognition agreements where countries agree to recognize one another's conformity assessments.

The EAC partner states need to enforce the reduction of NTBs by reducing the number of checkpoints, weighbridges, documentary requirements and regulations, improve and harmonize the operations of OSBP by building a comprehensive data network with professional systems and common information technology (IT) platforms to reduce on transit and clearance time at borders and ports. This will increase on fast-tracking and tracing of cargo in transit which will minimize cargo loss and reduce the delivery time into foreign markets.

The study limitations open up opportunities for further research. This study purely focused on the export competitiveness in EAC. Future studies may build upon our findings and study the subject in other developing countries and regional groupings. Such studies would be important to compare the results from different countries or regions that are heterogeneous in nature. In this study, the findings on the impact of shipment arrangements, customs clearance and trade infrastructure had a significant and negative effect on export competitiveness. Further research could be conducted in other developing countries or regions on trade in goods and services to confirm the impact of these logistics components on the export competitiveness, probably the results could be different.

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