Do Comparative Advantage, H-O Model, and Ice-berg Partial Equilibrium Model Explain Intra-COMESA Trade for Kenya?

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ABSTRACT

The paper is part of the dissertation and discusses the implication of international trade theories to intra-COMESA trade using Kenya as a case study. Kenya trades with more than 16countries in the COMESA region (Burundi, Comoros, Democratic Republic of Congo, Egypt, Ethiopia, Eswatini, Libya, Malawi, Madagascar, Mauritius, Rwanda, Seychelles, Tunisia, Uganda, Zambia, and Zimbabwe), thus the analysis. The paper employs the desk review method of research. The study used trade facilitation to measure trade costs. Therefore, the theoretical discussion referred to variables measuring trade costs: trade facilitation (authorized economic operator, single window), distance, common language, and adjacency. International trade theories are used to explain why countries trade beyond national borders. The analysis shows that one theory is insufficient to explain the volume of trade between countries; thus, different theories are explored to explain why countries engage in trade. The paper shows that while comparative advantage is the major theory in international trade, factor intensities and trade costs which determine the volume of international trade are explained by H-O model and Ice-berg partial equilibrium model thus no one theory can exclusively explain trade flows. Similarly, intra-COMESA trade can bet explained by classical and neo-classical theories of international trade.

INTRODUCTION

Bilateral trade is the exchange of goods and services beyond national borders, generally referred to as international trade. Trade has been practiced for a long time and has evolved through globalization and regional integration waves. Both phases strengthened the fact that countries do not exist in autarky but rather interact with each other for economic, political, and social mutual benefits (Hartzenberg, 2011). The difficulty in producing diverse goods is linked with differences in allocating resources and increasing national welfare irrespective of the level of economic development, which motivates trade (Rodrigue, 2020). Thus, the motivation behind trade has been well discussed since the works of David Ricardo. Through the wave of globalization, trade emerged as an important part of economic globalization and, later, economic integration. Several theoretical foundations explain the rationale of trade either being conventional or necessity (Ricardo, 1821; Smith, 1776).

As more recent theories were developed to critique and advance Smith's theory of absolute advantage, the theory of comparative advantage by David Ricardo of 1817 (in Chapter 7 of Principles of Political Economy) became the basis for international trade(Ricardo, 2004). This theory is the basis for advancements in trade and are used to explain trade in a study of Kenya's bilateral trade in COMESA. Nations in geographical regions are the regulatory and jurisdictional units, but the central unit of trade is the corporations with end products consumed by individuals (Rodrigue, 2020). Thus, the analysis on the trade facilitation whose implementation requires firms doing trade across borders.

Bilateral trade is assumed to take place between countries in proximity. For example, Kenya's bilateral trade is mainly with Uganda, which borders Kenya to the West. Uganda is the main destination for Kenya's exports. However, the Kenya National Bureau of Statistics [KNBS] (2023) shows that Kenya trades at a bilateral level with Rwanda and Burundi, which are landlocked and accessible by road. Trade between Kenya and these countries implies that road use is essential in bilateral trade in COMESA as many countries do not share waters or rail, thus the need for trade facilitation programs which facilitate ease of clearance and forwarding reducing delays at the border. Therefore, bilateral trade in COMESA would thus require countries to coordinate with each other and harmonize digital trade facilitation policies. The study thus focused on whether international trade theories can be used to explain the effect of trade facilitation on trade.

Trade facilitation is important to increasing the volume of trade between countries. Those countries that have high implementation of trade facilitation experience more trade. While exports are easier where programs reduce the documentation process and imports are cheaper where countries implement programs aimed at single launch of documents and payment of duties at the point of entry, lack of these programs lead to low trade levels as trade become costly. Kenya has accredited 218 AEO operators while implemented the single window in 2010. Kenya is also the second exporter in COMESA and the third importer. Furthermore, the main export destination for Kenya's exports Uganda, which is a member of COMESA (COMESA, 2022). Although studies have used international trade theories to model trade facilitation, the implication of those theories to different case studies is limited.

The objective of this paper is to review the implication of international trade theories to trade facilitation which is aimed at stimulating trade flows. Single window and Authorized Economic Operator were the two variables adopted in measuring trade facilitation. These two programs are customs based thus aimed at removing soft barriers to international trade. Kenya was the country of focus in the study of bilateral trade in COMESA. Therefore, this paper focus on investigating the implications of trade theories on Kenya's bilateral trade in COMESA.

The paper is structured in four sections. The subsequent section gives a brief review on literature, section three gives the methods, section four presents the discussion, section five gives the conclusion.

LITERATURE REVIEW

Empirical studies have been conducted on trade facilitation and international trade. Different authors have shown that international trade theories can explain bilateral trade and trade facilitation. Ice-berg partial equilibrium model was used by Chikabwi and Chikawa (2021) in investigating the effect of customs trade facilitation on intra-COMESA exports across 16 countries in 2018 cross-sectoral. The authors argue that bilateral trade costs are a function of customs trade facilitation such that a reduction in bilateral trade costs through trade facilitation boosts intra-COMESA trade exports.

Furthermore, Chikabwi and Chikawa (2021) applied comparative trade theory in exploring the effect of customs trade facilitation on bilateral trade exports for COMESA region. The authors posit that trade facilitation boosts bilateral trade flows through reducing total costs or production input cost. The comparative advantage theory implied that trade facilitation affects bilateral trade through reducing transaction costs and time. In addition, Gani (2017) employed comparative advantage to explore the logistics performance on international trade in 60 countries in 2007, 2010, 2012 and 2014. Gani also used the H-O theorem to show that logistic performance is a major determinant of international trade(Gani,2017). Schumacher (2013) deconstructed the theory of comparative advantage arguing that although the theory explains free trade, the assumptions on international immobility of labour and capital and the mechanisms that lead to adjustments resulting to balanced trade are almost inapplicable in a dynamic world. Rather than free trade, States intervene in policies hindering trade to be free. Akman (2016) exploring the facilitating role of visa policies on international trade for foreign direct investments argued that those nations with more

visa-free access experience low cost of trade and comparative advantage in international markets.

Bernard, Jensen, & Redding (2007) in a study of firms in international trade argued that comparative advantage could arise from cross-country difference in factor abundance as posited by H-O model. Wanyonyi & Chemnyongoi (2021) used comparative advantage theory and H-O model in estimating the economic effects of African Continental Free Trade Area in COMESA and found that exporting under AFCTA boost export survival compared to when Kenya had no trade arrangement within COMESA. Furthermore, Owino (2017) applied comparative advantage, H-O model and new trade theory in estimating the effect of trade facilitation on Kenya's exports to the European Union (EU) between 2004 and 2014. All the studies confirm that international trade theories explain trade flows between countries.

METHOD

The paper is part of a dissertation presented for PhD award and thus used desk review on literature from journal articles, books and government documents. The material was explored to evaluate the extent to which comparative theory, H-O model and ice-berg model explains bilateral trade. The study focused on the Common Market for Eastern and Southern Africa. While the study could have looked at intra-COMESA trade, the author focused mainly on Kenya and its trading activities with the Member States of COMESA. The literature reviewed for this study ranged several years to get a broader understanding of Kenya's bilateral trade in COMESA.

RESULTS AND DISCUSSION

International trade is based on the ability of firms to exchange goods and services. The production of the goods and services for trade is based on the resources available in a country. The extent to which firms use these resources determine the cost involved in production which then affects transport costs from the production site to the consumer. It is therefore the costs involved in trade which determine the volume of bilateral trade between countries. To evaluate if international trade theories explain Kenya's bilateral trade in COMESA, the author use comparative advantage theory, H-O model and the Ice-berg model of trade.

- **Theory of Comparative Advantage**

This theory was founded by David Ricardo in 1817. The comparative advantage theory relates to the relative opportunity costs of producing the same goods among countries. This theory bases its arguments for trade on differences in technologies across countries. Ricardo assumed bilateral trade between two countries, England and Portugal, with perfect mobile factors and two goods traded with no trade barriers. He argued that it is based on opportunity costs, that a country chooses to produce good *x* and import good *y* (Ricardo, 1821). In solving the challenge of more efficiency (absolute advantage), Ricardo argued that countries would trade out having a comparative advantage in producing a particular good relative to others. Ricardo used technology to explain international trade patterns, where he argued that differences in comparative costs of production determined trade patterns, thus reflecting differences in production technology. For example, the theory predicts that sugar exporters will display high labor productivity in producing sugar relative to labor productivity in other goods like wine. He referred to a case where country A can produce a good (*x*) with less labor (L) while country (B) produces a good (*y*) with less labor (L), then the two countries' freedom to produce and exchange goods will necessitate trade. His trade basis was thus on specialization, as Khaguli (2013) argued.

According to Ricardo, even if one country is less efficient than another in producing wine and cloth, there is still a basis for mutually beneficial trade. Therefore, rather than focusing on absolute advantage, Ricardo used opportunity cost to identify comparative advantage. Based on comparative advantage, trade occurs

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between country *i* and *j* when two scenarios hold such that the cost of producing *x* in *i* is not equal to the cost of producing *x* in *j*, and that *i* produces *x* cheaper than *j*. In this case, country *i* will export good *x* to country *j* for which it is cost effective in producing compared to country *j* and on the other hand, import good *y* from country *j* in which it has a comparative disadvantage. Similarly, country *j* will export good *y* to country *i* and import good *x* from county *i* thus;

$$\delta_i^x > \delta_j^x ;\ \delta_i^y < \delta_j^y \qquad (1)$$

In scenario 2, trade cannot occur under comparative advantage as countries in trade not only consider production costs but also transaction costs of moving goods from production point, across borders to the final destination. Therefore, if country *i* is producing good *x* to export to country *j*, the total cost incurred in the export of such good is production cost plus transaction costs presented as;

$$TC_{ij}^x = \delta_i^x + T_{ij} \qquad (2)$$

Where TC_{ij}^x denotes the total costs of exporting good *x* from country *i*to country j, δ_i^x is the cost of producing good *x* in country *i*and $T_{ij}$are the transaction costs of exporting good *x* into country *j*.

Considering the equation above, for country*i* to produce and export good *x*, then the relative cost of producing the good in country *i* should be lower than producing that good in *j* and relative cost of producing good *y* in country *j* should be lower than producing the good in *i.* The customs trade facilitation such as authorized economic operator program and single window boosts bilateral trade by reducing total trade costs TC_{ij}^x through manipulating trade transaction costs T_{ij}which then reduces total costs of trade or by reducing the production costs. Therefore, customs trade facilitation influence trade flows through influencing bilateral border costs;

$$X_{ij} = f(T\delta_{ij}) \qquad (3)$$

$$T\delta_{ij} = f(ctf) \qquad (4)$$

Where X_{ij} are exports from country i to country j, $T\delta_{ij}$ are bilateral border costs between country i and country j and ctf are customs trade facilitation programs.

While equation 3indicates that exports are a function of bilateral border costs, equation 4 shows that bilateral border costs are a function of trade facilitation and thus manipulating trade facilitation.

Implications of Ricardo's Theory

Paul Samuelson argues that Ricardo's theory has a stand in international trade. This is because whether two regions or countries are more efficient in producing goods than the other if each of these countries specializes in producing goods with a comparative advantage, trade will ultimately profit both countries (Samuelson, 1948). The theory explains why countries use and exploit their natural wealth to produce a particular good based on production efficiency. In regard to the study of Kenya's bilateral trade in COMESA, Ricardo explains why countries in COMESA trade, although they are labor endowed regarding the cost of labor. It is based on the technology production and comparative efficiency in producing goods *x* than *y* that COMESA countries engage in trade with Kenya, but that is insufficient to explain trade in COMESA.

For Kenya to export to its trading partners in COMESA, the relative total cost of producing good *x* in Kenya should be lower than that of the partner country. On the other hand, for a partner country to import good *x*

from Kenya, then the production cost of such a good in the partner country should be higher than that in Kenya. This can be done by reducing trade transaction costs that directly reduce total costs through reducing production input costs (Yotov et al., 2017).

Since firms rather than the government conducts trade, importers and exporters engage in trade based on comparative advantage in the country of origin. Traders choose to import or export depending on the opportunity cost, which is the potential benefit that a party loses when selecting one option over the other. When Authorized Economic Operator (AEO)-accredited import and export firms learn of a comparative advantage existing in the COMESA Member States, they will lean towards importing from and exporting to that country as production, transport to transaction fees will likely be lower than where the good is produced at a higher price.

The theory is critiqued for assuming free trade and international mobility of goods without any restrictions, which is not the case in COMESA, as transport, information, and transaction costs significantly affect the cost of trade. Furthermore, Samuelson's (1948) factor price equalization theorem renders the scale of movement of workers and capital superficial regarding international trade. He assumed that international trade led to the same results as if capital and labor were mobile; hence, there was no basis for global mobility of factors of production. Furthermore, Ricardo (2004) states that if the assumption of international immobility didn't apply, comparative advantage couldn't determine international trade. In the current global economy, factors of production are mobile internationally (Schumacher, 2013). In addition, labor and capital are mobile in most COMESA countries, and despite that, countries continue to trade in those goods they claim a comparative advantage in producing. Therefore, the assumption of the immobility of factors of production across international borders assumption does not hold in a dynamic world.

Krugman (2011) criticized Ricardo's theory by arguing that the continued application of economies of scale using new technologies allows countries to produce cheaply and export the surplus. A combination of excess demand for choice and variety leads countries to produce a variety for the world market rather than specializing in a narrow range of products. In addition, the theory assumes that countries have a difference in their natural resource base. However, government intervention can overcome this natural disadvantage by building skills and knowledge in technology related to their natural resource wealth. Furthermore, international trade is influenced more by tariffs and trade costs than by comparative advantage (Kikuvi, 2019). Therefore, comparative advantage theory could not fully explain the pattern in bilateral trade in COMESA.

- Heckscher-Ohlin (H-O) Theory of Factor Endowments

Eli Heckscher developed this theory in a 1919 article with his student Bertil Ohlin in a dissertation, 'Developing Heckscher's Ideas' in 1933. The theory is commonly known as the H-O model of trade following its founders. The theory advanced the assumption of David Ricardo's theory of comparative advantage by increasing the factors of production from labor (L) to labor (L) and capital (K). Ricardo argues that comparative advantage arises from the difference in opportunity cost, productivity, and labor. On the other hand, H-O argues that the difference in factor endowments, with two factors of production, labor, and capital and two countries (A) and (B), is the basis for comparative advantage in international trade (Heckscher, 1919).

The theory states that comparative advantage is derived from the difference in relative factor endowments across countries and relative intensities under which factors are used across sectors. Differences in factor proportions required in the production of a good constitute the difference in comparative costs between different countries, leading to a difference in the market price of a good in different countries, thus the basis for international trade (Stone, Cepeda, & Jankowska, 2011). For H-O model, if labor is cheap in country A and capital is cheap in country B, Country A will be labor-endowed (relatively more labor abundant), thus

having a comparative advantage in exporting labor-intensive goods and importing capital-intensive goods. On the other hand, if country B is relatively abundant in capital, it will export capital-intensive goods and import labor-intensive goods (Kahram, 2015).

H-O assumes that tastes are equal in country A and B, with perfect factor mobility in each country and no international factor mobility, transport costs or tariffs. They also assume that all resources are fully employed for both countries and that international trade is well balanced. Therefore, using factor intensity in two countries and two commodities, *x* and *y*, *y* will be capital-intensive if K/L ratio for *y* is greater than K/L ratio for *x*. Using relative factor prices, *y* being capital intensive will mean that it is cheaper to produce *y* for country B than for country A when *x* is highly labor intensive.

In addition, factor abundance is defined by physical units, considering the total supply of factors, and relative factor prices, which consider the rental cost of capital (PK) and labor time price (PL). The theory assumes that capital-abundant countries like the USA and industrialized countries like China will export capital-intensive goods. Alternatively, the capital-abundant countries will trade in for labor-intensive goods from labor-abundant countries like India. This is the same case for labor-abundant countries that export labor-intensive goods and import capital-intensive goods.

The Implication of the H-O Model

H-O theory implies that Kenya will trade with its partners in COMESA based on relative price factor and factor abundance for labor and capital. Those capital-endowed countries in COMESA will import labor-intensive goods from Kenya. On the other hand, Kenya will export the goods it is endowed to produce to its trading partners in COMESA. It is important to note that although Kenya's partner countries are endowed with almost similar factors of production, mainly labor, the production capacities in using labor differ from one country to another, thus necessitating trade.

Using the H-O assumptions to explain bilateral trade in COMESA, there is a need to understand the country-specific endowment factor. For most countries in COMESA, labor is more abundant than capital; thus, it is cheaper to produce labor-endowed goods than capital-endowed goods. Therefore, countries end up trading more agricultural products than manufactured goods. Further, the service sector ends up contributing a larger percentage to trade as labor is needed to offer services. For Kenya, the main principal domestic exports between 2018 and 2022 were tea, accounting for 20.9 per cent of the total value of principal domestic exports and horticulture, accounting for 19.5 per cent of the total value of principal domestic exports (Kenya National Bureau of Statistics [KNBS], 2023). This indicates that Kenya exports more labor-abundant goods compared to capital-abundant goods. Therefore, export firms in Kenya will trade in labor-endowed goods more than capital-endowed goods.

H-O model considers one factor abundant in relation to other factors; thus, it's possible, even when a country has more capital in absolute terms than another country, to still be poor in the capital (Leontief, 1956). Therefore, in the H-O model, a country is considered endowed with capital only if the ratio of capital to other factors is higher compared to that ratio in another country. Thus, this theory is more likely to hold when relative abundance is defined in relative prices (factor price ratios).

The theory's assumptions that there are no production differences, no transport costs, the production function is identical, and all countries use the same technology are almost unrealistic as production differences and transport costs determine product prices, determining the volume traded between countries. Furthermore, Leontief tested the assumption that capital-endowed countries export capital-intensive goods to the world. Using input-output analysis, he estimated the ratio of capital stocks to the number of workers in the USA import and export competing companies in 1947. He multiplied the input-output matrix by the capital and labor input vector and import and export values. He established a paradox that the USA was

exporting labor-intensive goods in exchange for capital-intensive goods. Therefore, the assumption that capital-endowed countries export capital-intensive goods does not hold in a dynamic world.

The theory is also critiqued for assuming fixed quantities of factors of production, thus investigating trade in a static model while trade happens in a dynamic setting. Exporting industries pay high wages to laborers instead of labor-intensive exports produced by cheap labor. Therefore, countries produce and export goods available in it, and trade occurs in those unavailable at home. Anderson (2000) used the Kravis theory of availability of 1956 to determine if labor-intensive exports were produced by cheap labor. He found that in most countries, exporting industries paid high wages to the laborers as opposed to the H-O argument of relative factor prices. Instead, he argued that countries would trade in goods available in it, those goods developed by its innovations and entrepreneurs.

A SIMPLE 'ICE-BERG' PARTIAL EQUILIBRIUM MODEL

The theory was developed by Paul Samuelson in 1954 to model the effect of trade costs, especially transportation costs on bilateral trade. Later studies used the model to analyze the effect of trade costs due to poor trade facilitation. The theorist argues that when trade procedures cease being efficient, trade costs increase, increasing the differences between production and purchasing prices, and the purchasing price increases, leading to disequilibrium (Samuelson, 1948). He further argues that inefficient trade procedures lead to high total trade costs, generating a wedge between producer and consumer prices and deadweight loss. The theory perceives the difference in production and purchasing price to be similar to the loss an 'ice-berg' undergoes as it floats while melting across the ocean. As a result, trade costs are proportional to the value of goods shipped. However, the main results continue to hold even when trade costs are additive (WTO, 2015). The theory is equivalent to the gravity model of trade, which argues exports from county *i*to country *j* is a positive function of the economic masses of trading countries and are inversely proportional to the distance between them.

The Implication of the Ice-Berg Partial Equilibrium Theory

The model underpins the objective of stimulating bilateral trade, which cannot be achieved without interventions to reduce trade costs. Therefore, the theory suggested that trade facilitation interventions will manipulate bilateral trade costs (Anderson & Wincoop, 2003). Kenya's exports to the COMESA region will be determined by the cost involved from production to consumption. The cost involved will determine how much a country imports from Kenya and how much Kenya exports to the trading partners in COMESA. If the cost outweighs the benefits, then countries will turn to imports outside COMESA, thus reducing Kenya's trade with COMESA. Furthermore, Krugman's new trade theory explained in theories of bilateral trade coupled with country similarity theory have aspects of trade facilitation, arguing that transport costs influence trade. For example, Krugman argued that tariffs and trade restrictions influence trade, thus recognizing the role of trade facilitation in trade gains (Krugman, 1979).

The theory focuses on transportation costs and ignores other costs involved in production and consumption of goods. The theory does not explain other costs, such as information costs and transaction costs, which raise the costs of doing trade. Kenya and partner countries in COMESA are not only widely dispersed, raising the cost involved in transportation, but also do not share similar official languages and have not uniformly implemented the authorized economic operator, thus raising trade costs.

CONCLUSION

The objective of this paper is to review the implication of international trade theories to trade facilitation which is aimed at stimulating trade flows. A study on intra-COMESA trade between 2004 and 2021 used

single window and Authorized Economic Operator to measure trade facilitation. Kenya was the country of focus in the study of bilateral trade in COMESA considering the availability of data and the fact that it is the second exporter and third importer in COMESA. The paper shows that while comparative advantage is the major theory in international trade, factor intensities and trade costs which determine the volume of international trade are explained by H-O model and Ice-berg partial equilibrium model respectively thus no one theory can exclusively explain trade flows. Similarly, Kenya's bilateral trade is based on theory as Kenya trades in those goods its well-endowed to produce and the implementation of authorized economic operator and single window boosts Kenya's bilateral trade in COMESA through reducing trade costs.

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