

Assessing the impact of trade facilitation on SADC's intra-trade potential

Contents

Abstract.....	3
1 Introduction.....	4
1.1 SADC's trade transaction costs	5
3 Methodology	9
3.1 Gravity model analytical framework.....	9
3.2 Empirical model.....	10
3.3 Trade potentials.....	11
3.4 Data and data sources.....	12
3.4.1 Trade facilitation measures	12
3.4.2 Trade flows and other variable	14
4 Results.....	14
4.1 Gravity trade model estimations	14
4.2 Trade potential estimations.....	17
4.2.1 Comparison with other studies	20
5.1 Conclusions.....	20
References.....	22

Abstract

This study's uniqueness is that it departs from the usual approach employed by most studies which used costs of transport as a measure of trade facilitation in the gravity model, sets itself apart by the fact that it includes a variety of indicators of trade facilitation. The main objective of this article is to estimate SADC countries' bilateral trade potential which may result following improvements in trade facilitation. The set of indicators includes country-specific trade facilitation indicators for port efficiency, customs environment and e-commerce use by business. The research found that improvements in port efficiency and increased use of e-business are some of the factors which boost intra-SADC trade in exports. Whilst the positive influence of each of these two variables differ between exporting countries and importing country, the fact remains that SADC policy makers should implement strategies which improve port efficiency and also encourage use of e-business.

The potential trade simulations show that countries such as South Africa and Zimbabwe, among others, have exhausted their respective trade potentials with regional trading partners. On the other hand, countries such as Botswana and Madagascar, among others, had untapped trade potentials with more than seven of the regional trading partners. Exhaustion of trade potentials is an indication of a successful partnership among trading countries (International Trade Centre (ITC) (2005, 2003). Exhaustion of trade potential does not imply that these countries should not trade, but only implies that it may be difficult to increase the levels of trade with such trading partners. As such, the best that can be done especially by the reporting partners is to ensure they try to maintain that level of trade. Those countries with unrealized trade potential should continue endeavours to improve their trade facilitation (among other issues to be improved). The potential to trade will be even further enhanced if all the member countries which have been indicated as having untapped trade potential with the reporting SADC reporting countries also improve on their trade facilitation.

1 Introduction

Steady increases in trade volumes and complexity in recent years have significantly changed the operating environment for the international trading community (OECD, 2005). As import tariff rates have fallen, assessing how other factors affect trade has increasing policy relevance (Wilson et al, 2005) given that a host of other non-tariff measures (NTMs) or non-tariff barriers (NTBs) have taken centre stage in being some of the policy tools used by both developed and developing countries to shape their trade policy in one way or the other. This change in trade environment has also highlighted the negative impact of inefficient border procedures on governments, businesses and ultimately on the customer and the economy as a whole. In some instances, governments may face smuggling, fraud and national security problems, which drain the public coffers, while businesses pay the price of slow and unpredictable goods delivery, costly customs procedures, and even lost business opportunities. All these costs ultimately make goods more expensive for the consumer and this has been one of the issues bedevilling intra-regional trade in the Southern African Development Community (SADC) region over the recent years. In some cases, these “hidden” costs of trade are so high, as much as 15% of the value of the goods traded in some cases. As such studies show that for many countries, the welfare benefits from more efficient customs procedures could be as high as those from reducing tariffs (OECD, 2005). This is a problem for all trading nations, and finding ways to make the whole process of trading simpler and smoother – trade facilitation – is a key element not only to trade in general, but also of the Doha Development Agenda (DDA) for multilateral trade negotiations at the World Trade Organization (WTO) level.

Although there is no standard definition of trade facilitation (TF) in public policy discourse (Wilson et al, 2003, 2003; Grainger, 2010; WTO, 2001 and OECD, 2001), WTO and UNCTAD defines trade facilitation as “simplification and harmonization of international trade procedures, including activities, practices, and formalities involved in collecting, presenting, communicating, and processing data required for the movement of goods in international trade”, (WTO website, and UNCTAD, E-Commerce and Development Report 2001, p 180). Grainger’s (2011) is the definition adopted in this study and it considers trade facilitation (TF) as “... *how procedures and controls governing the movement of goods across national borders can be improved to reduce associated cost burdens and maximise efficiency while safeguarding legitimate regulatory objectives*”. In this context, the topic of trade facilitation has four interdependent themes: (1) the simplification and harmonisation of applicable rules and procedures; (2) the modernisation of trade systems, and the sharing and lodging of information between business and government stakeholders in particular; (3) the administration and management of trade and customs procedures; and (4) the institutional mechanisms to safeguard effective implementation of trade facilitation principles and the on-going commitment to reform.

In the contemporary world, the relationship between trade flows and trade facilitation has thus become complex given that a country’s trade flows will change not only through its own reforms but also the reforms of its trading partners (Wilson, et al, 2005). Differences in the relative magnitudes of trade facilitation effort on trade, as calculated by category of trade facilitation effort or group of trading partners, could help focus and clarify development agendas.

In the SADC region, although import duties or trade tariffs have gradually declined over the years, especially since 2001 when most countries started implementing the regional tariff phase down (in line with SADC Protocol on Trade obligations) which resulted in the bloc becoming a free trade area (FTA) in 2008, other non-tariff measures (NTMs) or non-tariff barriers (NTBs) have however negated the benefits which were supposed to be enjoyed due to FTA status. In an effort to deal with these NTMs/NTBs, most regional members, both on individual capacity and at SADC regional level have started looking into ways of removing these barriers through trade facilitation (TF).

In light of the above, there is, therefore, a lucid need to continuously enhance the volume of intra-SADC trade. In this regards, an estimation and analysis of the member countries' trade potentials with their regional trading partners is not only appropriate, but also imperative. According to SADC Protocol on Trade, the region seeks to promote trade among its members, by among other things, removing and/or reducing any potential impediments to free flow of goods among member states. Thus, the main objective of this article is to estimate SADC countries' bilateral trade potential which may results following improvements in trade facilitation.

This analysis is important, especially at this juncture, because of the following two reasons. Firstly, although most SADC regional countries have reduced their intra-trade import duties, intra-regional trade has not significantly improved implying that some impediments (which include trade facilitation issues) might be a play in hindering such trade. As such an investigation of the potential impact of various trade facilitation components on intra-SADC trade will be important. Secondly, the study investigates the extent to which SADC countries have unrealized trade potential with their regional counterparts with whom they participate in the regional free trade area (FTA).

The gravity trade model will be employed to achieve the objective of the article. Gravity trade models are some of the most popular empirical tools used for modelling bi-lateral trade flows and have been the main methodology used in investigating unrealized export potentials in trade literature. Given that the study's main aim is to investigate trade facilitation, the procedure to be employed in this research will involve generating a set of distinct trade facilitation indicators and further include them in a gravity model of trade.

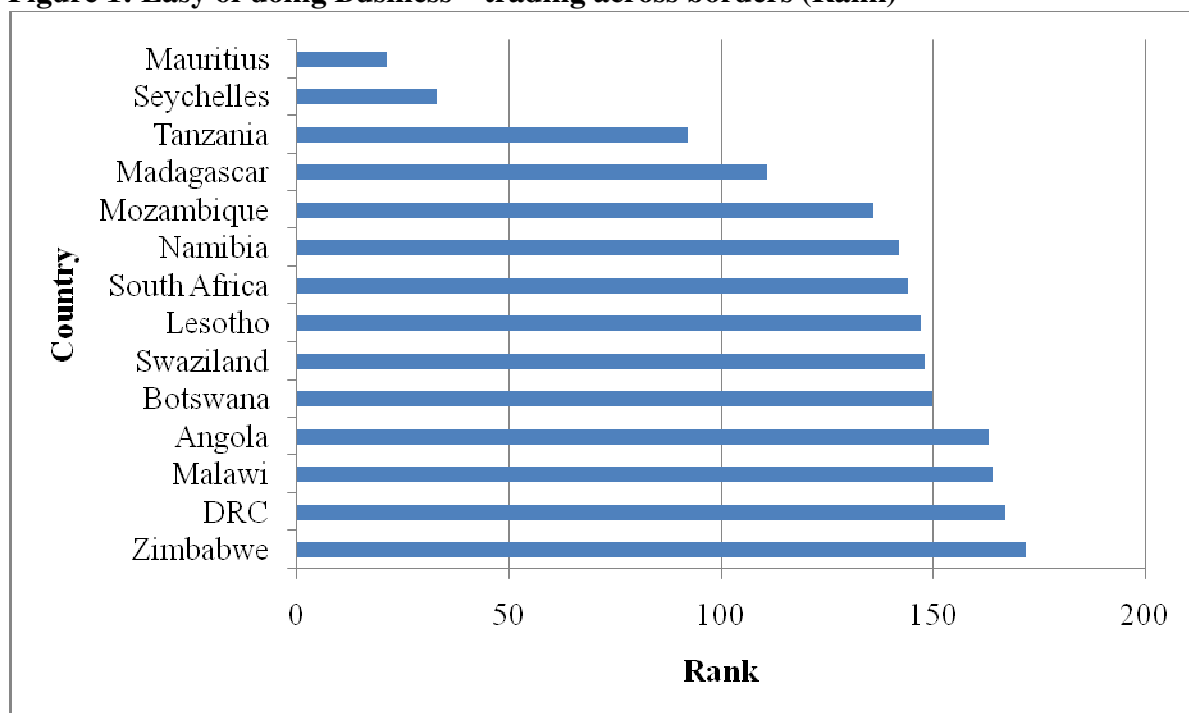
The rest of the paper is structured as follows: the next sub-sections provide a brief analysis of SADC countries' trade transaction costs. Section 2 provides literature review while Section 3 contains the methodology of the study and the data used. Results are detailed in Section 4 with conclusions being the subject of Section 5.

1.1 SADC's trade transaction costs

The World Bank's 'Ease of Doing Business' rankings include a component relating to *trading across borders*. This reflects the number of documents necessary to export and import goods, and the time and costs of trade, among others. Higher rankings indicate greater ease of trading across the border. According to the Bank's latest 2012 "Easy of Doing Business" in which 182 countries were surveyed, Singapore was ranked number 1 overall among all these countries. All the SADC countries were part of the survey and a closer look at the data indicates that Mauritius topped the SADC countries.

The ‘Ease of Doing Business’ *trading across borders* is an index which has six sub-components namely (i) documents to export (total number), (ii) documents to import (total number), (iii) time to export (in days), (iv) time to import (in days), (v) cost to export (US\$ per container) and (vi) cost to import (US\$ per container). Figure 1 shows the ranks of SADC Member States for trading across borders. As indicated in the figure, Mauritius, which ranked 21 out of 182 countries, was also the top SADC country which had good ‘easy of doing business’ with regards to trading across borders. Seychelles followed as the second SADC country and ranked 33 in the total 182 countries. On the other hand, Zimbabwe was at the bottom of the SADC rank and was also ranked 172nd out of the 182 countries.

Figure 1: Easy of doing Business – trading across borders (Rank)

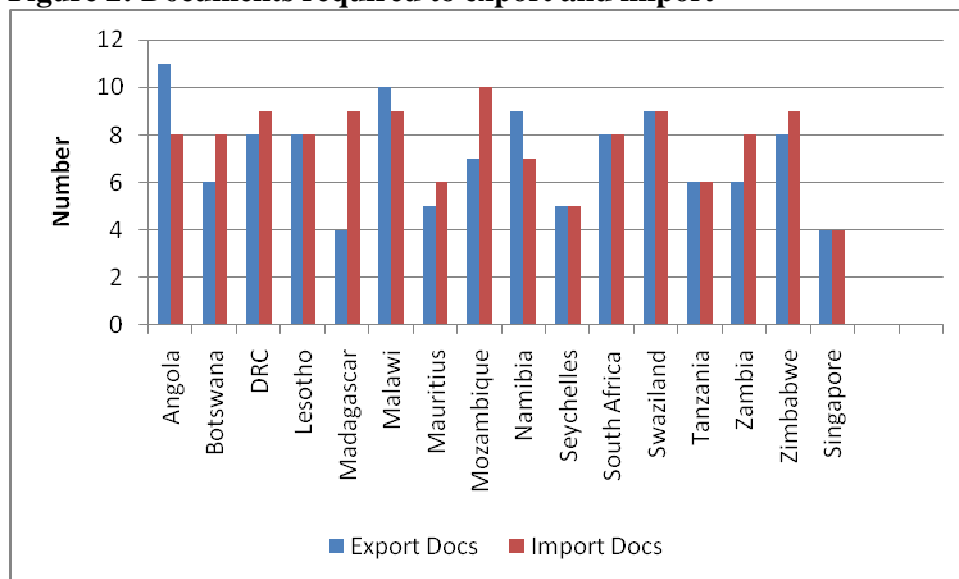


Source: World Bank (2012) online database.

Note: Ranking in ‘2012’ listing out of 182 countries

A closer look at some of the *trading across borders* sub-components indicates that the requirements for exporting and importing within the SADC region are diverse. When one considers documents required to export and import, Figure 2 shows that overall there is a wide range of requirements among SADC countries and that, Seychelles, requires fewer trade documents per shipment (five documents both when exporting and when importing) than the other SADC countries on average, with Mauritius requiring nearly same documents (five documents when exporting and six documents when importing) as Seychelles. These two countries’ document requirements for exporting and importing are closer to the ‘best’ scenario country, Singapore (which requires only four documents both when exporting and when importing). On the other, countries which require more documents include Angola (11 documents for exportation and 8 documents when importing). Figure 2 depicts the number of documents need for each SADC county when exporting and importing, with Singapore included as a benchmark country.

Figure 2: Documents required to export and import

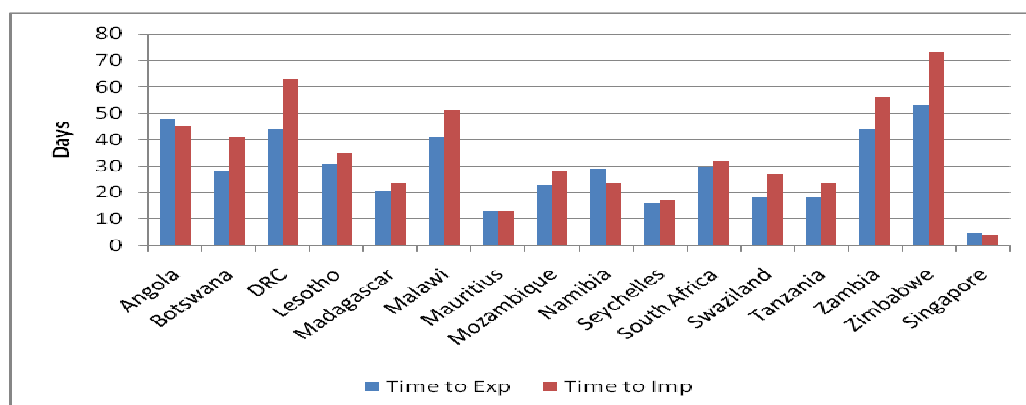


Source: World Bank (2012) online database.

Figure 3 indicates the total number of days required to do all the documentation and formalities before exporting or when importing in each of the SADC countries. At regional level, the surveyed data shows that Mauritius was the best performer in this category, with both the exporter and importing requiring 13 days each to conduct all the formalities needed before exporting or importing. Seychelles came closer, with 16 days required before exporting and 17 days when importing.

The worst performers with regards to days needed before exporting and importation are Zimbabwe which requires 53 days before one exports and 73 days when importing; Angola (48 days before exporting and 45 days when importing), Zambia (44 days before exporting and 56 days when importing) and DRC (44 days before exporting and 63 days when importing).

Figure 3: Number of days required to complete export/import formalities



Source: World Bank (2012) online database

2 Literature review

Generally, empirical studies on trade facilitation are currently scanty, and the situation is worse when one considers the African continent, let alone SADC region. As presented in this section, given none existence of one agreed definition of trade facilitation (TF), most studies used different measures of TF in their analysis and estimations.

A 2000 study by Australian Department of Foreign Affairs and Trade and Chinese Ministry of Foreign Trade and Economic Cooperation found that moving to electronic documentation for trade would yield a cost savings of some “1.5 to 15 percent of the landed cost of an imported item.” Freund and Weinhold (2000) employed a gravity model to estimate the role of e-commerce in promoting bilateral trade. The study found that a 10 percent increase in the relative number of web hosts in one country would have increased by one percent trade flows in 1998 and 1999.

The analysis which was conducted by Fink, Mattoo and Neagu (mimeo) applied a gravity model to estimate the effect of the communication costs on bilateral trade. They found that a 10 percent decrease in the bilateral calling price was associated with an 8 percent increase in bilateral trade.

Moenius (2000) applied a gravity model to estimate the effect of bilaterally shared and country-specific standards on goods trade. He concluded that the bilaterally shared standards can promote trade. Otsuki, Wilson and Sewadeh (2001a, 2001b) employed a gravity model to the case of food safety standards, and found that African export of cereals, nuts and dried fruits were likely to fall by 4.3% on cereals, and 11% on nuts and dried fruits following a 10% tighter of EU standard on aflatoxin contamination levels of these products.

The study by Simwaka (2011) estimated the trade potential expected from the SADC FTA. Specifically, the study investigated what the Southern African countries could gain by way of increases in intra-regional trade if all trade barriers were to be removed. The paper employed the gravity trade model and it found that observed intra-regional trade was lower than its potential, thus suggesting existence of trade potential in the sub-region. The results of the study were however done at aggregate regional level, and not at country-to-country level.

The paper by Cassim (2001) employed a cross section econometric gravity to investigate the potential for trade among SADC countries. The research found existence of unrealized potential trade mostly between South African and Zimbabwean. The Chauvin et al. (2002) study investigated the benefits expected from the SADC FTA given the economic structure disparities existing among its participating members. In its analysis, the paper presented and analyzed three complementary approaches, with the first two being trade indices: export diversification indices, revealed comparative advantages and trade complementary indices, and the last one was based on gravity model. The research found that trade was nearly exhausted with limited space for further trade potential increase. An earlier study which was done by Elbadawi (1997) before SADC free trade area (FTA) became into existence found that the region had no significant effect on trade among its members, although the performance of the bloc was slightly improved when controlling for exchange rate policy effects.

Despite existence of the above studies and others not cited in this present study, the present research's value, among others, include the fact that it uses a number of variables to capture trade facilitation whereas most studies used distance. Furthermore the present study estimates the potential trade at bilateral level when compared to most studies so far which did the investigation at regional aggregate level.

3 Methodology

3.1 Gravity model analytical framework

The study will follow the methodology which has been used by most studies on the same subject matter which is the gravity trade model approach. Whilst the gravity model has been used in a number of fields of studies such as human migration and investment flows across countries, its application in international trade seems to dominate its overall use. The gravity trade model borrows from Isaac Newton's (1687) "Law of Universal Gravitation" which postulates that the force of attraction, F_{ij} , between two separate entities i and j is a positive function of the entities' respective masses, m_i and m_j , and inversely related to the squared distance, d_{ij}^2 , between the objects. This law is formalized as:

$$F_{ij} = G \frac{M_i M_j}{D_{ij}^2} \quad (1)$$

where:

- F_{ij} = the force of attraction,
- M_i and M_j = are the respective two entities' masses,
- D_{ij}^2 = the distance between the two entities (objects), and
- G = a gravitational constant depending on the units of measurement for mass and force.

In analysing trade, the basic gravity trade model which has been used in empirical work over the years was originally specified by Tinbergen (1962) and Poyhonem (1963) as follows:

$$Trade_{ij} = \alpha \frac{GDP_i^{\beta_1} GDP_j^{\beta_2}}{(D_{ij})^{\beta_3}} \quad (2)$$

Where $Trade_{ij}^1$ represents bilateral trade between countries i and j , while GDP_i and GDP_j denote countries i and j 's respective gross domestic products. D_{ij} is used as a proxy of bilateral distance between the two trading countries. In the formula above, the α and β 's are parameters and the signs of β_1 and β_2 are expected to be positive, while that for β_3 will have a *a priori* negative sign. Thus, comparing Equations (1) and (2), it can be seen that in analyzing trade using the same gravity principle, the entities in Equation (1) are replaced by a pair of countries in Equation (2), while the countries' masses in Equation (1) are proxied by the respective GDP in Equation (2) with distance replaced by a variable representing resistance, which in most cases is the actual distance between the trading countries.

¹Trade in this case can be replaced by either exports or imports, depending on the variable the one may want to investigate

Rewriting Equation (2) in logarithmic format, a linear version of the model can be represented as follows:

$$\ln(\text{Trade}_{ij}) = \alpha + \beta_1 \ln \text{GDP}_i + \beta_2 \ln \text{GDP}_j - \beta_3 \ln(D_{ij}) + \mu_{ij} \quad (3)$$

where α , β_1 , β_2 and β_3 are coefficients to be estimated. The disturbance error term (μ_{ij}) captures random events which may have an impact on bilateral trade between the two trading countries and is assumed to be stationary, with a mean of zero and a constant variance. Thus, Equation (3) is the core gravity equation which has been used in all empirical studies, albeit with added right hand side (RHS) variables, with each RHS variable added depending on the particular facet of trade being analyzed, the objectives to be achieved and availability of data. In this basic gravity theory, a positive correlation is expected between trade and GDPs, while a negative relationship will be expected between trade and distance.

3.2 Empirical model

The proposed empirical model which borrows from Wilson et al (2003, 2005) is given by Equation (4).

$$\ln(\text{Exp}_{IJ}^t) = \alpha_0 + \alpha_1 \ln(100 + \text{tariff}_{IJ}^t) + \alpha_2 \ln PE_I + \alpha_3 \ln CE_I + \alpha_4 \ln EB_I + \alpha_5 \ln \text{GDP}_I^t + \alpha_6 \ln \text{GDP}_J^t + \alpha_7 \ln \text{DIST}_{IJ} + \alpha_8 \text{LANG}_{IJ} + \alpha_9 \text{CB}_{ij} + \varepsilon_{ij} \quad (4)$$

Where I and J stand for the exporter and importer respectively, and t denotes trading years ($t=2006, \dots, 2010$). The value of exports from country I to J is denoted as Exp_{ij} . The term tariff_{ij} denotes applied tariff rate in the percent ad valorem term that is specific to the trading partners I and J and year t . The inclusion of the tariff variable is useful for reducing omitted variable biases. It is particularly important for non-SACU SADC countries since their tariff policies are not harmonized and as such applied tariff rates generally vary across the member countries and/or across their exporting partners.

The terms PE_I , CE_I , and EB_I denote importing country J 's indicators of port efficiency, customs environment, and e-business usage, respectively. The term GDP denotes gross domestic product and is expressed in US dollar terms. Geographical distance between capital cities I and J is denoted as DIST_{IJ} . Dummy variables are included to capture the effects of language similarity and adjacency. The language dummies (LANG) include English, French and Portuguese. The adjacency dummy or common border (CB_{ji}) takes the value of one if country I is adjacent to country J and zero otherwise.

Parameter α 's are coefficients. The time invariant term I is the exporter-specific intercept that captures the exporter-specific fixed-effects such as variation of trade flows due to the unobserved difference in quality of goods, domestic policies and border costs in exporting countries. The term ε_{ij} is the error term that is assumed to be normally distributed with mean zero. Table 2 shows the variable names and expected signs for the four trade facilitation measures.

Table 2: Gravity model explanatory variables

Variable	Expected sign	Theoretical intuition
Trade Facilitation Measure		
Port Efficiency (PE)	+	As port efficiency improve at destination J , X_{IJ} increases.
Customs Environment (CE)	+	As economy J implements simple customs procedures, X_{IJ} increases.
E-business Usage	+	As economy J increases business use of Internet, X_{IJ} increases.
Exporter GDP	+	Measures production capacity, more production means more exports
Importer GDP	+	Measures absorption capacity, higher GDP, means higher import demand
Distance	-	Imposes trade costs, greater distance means more costs, hence less trade
Language	+	Sharing same language reduces costs, and increase trade
Adjacent (border)	+	Countries closer to each other tend to trade more
RTA dummy	+	Countries enter into RTAs with the objective of increasing trade

Source: Author compilation

3.3 Trade potentials

After estimating the gravity model for intra-SADC trade (Equation 4), the study will proceed to estimate the export trade potential for each of the regional member states in the sample. This section will rely on the gravity model results from Equation (4). The ratio of export trade potential (P) as simulated/predicted by the gravity model and actual export trade (A), i.e., (P/A), will be used to analyze the future direction of export trade for each of the countries. In terms of interpretation, in a case where the value of the ratio (P/A) exceeds 1, that will indicate existence and evidence of unrealised (or untapped) trade potential between each SADC member countries' trade with other regional member countries. For instance, if the value of (P/A) is greater than 1 for a given country, say Malawi's export trade with Tanzania, it will imply that Malawi will be having untapped or unrealized trade potential with Tanzania. In this instance, and following Batra (2004) and the International Trade Centre (ITC) (2005, 2003), evidence of unrealized export trade in turn implies the potential for Malawi to expand its exports to Tanzania. On the other hand, if the value of (P/A) is less than 1 for a given country, say Botswana's export trade with Mozambique, it indicates that Botswana has exceeded its trade potential with Mozambique. In short, values of (P/A) can either be greater than or less than 1, with the former indicating countries which have potential for expansion of export trade in the foreseeable future between them, while the latter shows trading partners with which export trade have already exceeded its trade potential.

Conversely, the absolute difference between the potential and actual level of export trade, that is, the value of (P-A) can also be used to indicate whether a country has unrealized export trade potential with a given country or not. In this case, a positive value will indicate unrealized export trade potential, thus the possibility of future export trade expansion into that country while a negative value will indicate that the country's exports have already exceed their trade potential.

3.4 Data and data sources

3.4.1 Trade facilitation measures

Wilson et al (2003) argues that the greatest challenge to new research on the issue of trade facilitation is to find conceptually distinct measures of trade facilitation that better meet policy maker's needs for specificity on how to approach trade facilitation efforts. Questions which can be asked are: Should policymakers focus on ports, on customs reforms, on international regulatory harmonization, or e-commerce? Of course there are synergies among these various reforms, but limited resources mean that not all can be tackled at once. Previous efforts that proxy trade facilitation with import prices or transportation costs cannot provide this link to policies or projects that decision-makers need. Accordingly, we derive indicators of trade facilitation that measure these three different approaches to trade facilitation.

Given this limited ability in getting quantitative trade facilitation variables, the study include three indicators of trade facilitation that measure three different categories of trade facilitation effort and these are:

1. Port efficiency (PE),
2. Customs Environment (CE),and
3. E-business usage (EB).

As pointed by Wilson et al (2003, 2005), *Port Efficiency (PE)* is designed to measure the quality of infrastructure of maritime and air ports. *Customs Environment (CE)* is designed to measure direct customs costs as well as administrative transparency of customs and border crossings. *E-Business Usage (EB)* is designed to measure the extent to which an economy has the necessary domestic infrastructure (such as telecommunications, financial intermediaries, and logistics firms) and is using networked information to improve efficiency and to transform activities to enhance economic activity.

Each of these indicators is generated from data specific to each SADC Member State. Thus, these indicators help policymakers judge how their economy performs in each of these three areas. Furthermore, between these self-assessments against best practice and estimation results on the effect of these three trade facilitation indicators on trade flows, substantially more information is available to policymakers about what might be the most fruitful direction for reform, capacity building, and negotiation.

In order to generate the trade facilitation indicators, the study relied heavily on survey information. Our sources include: World Economic Forum Global Competitiveness Report (henceforth GCR). Transparency International (TI), and Micco, Ximena and Dollar (2001), Maritime Transport Costs and Port Efficiency, World Bank Group (henceforth MXD).

The study's approach in generating the three trade facilitation indicators "over-samples" the survey data so as to reduce dependence on any one source or survey response. That is, each of the three trade facilitation indicators is constructed with multiple data inputs. We can analyse the inputs to gain even greater information about the trade facilitation measures, both for an individual economy and across the SADC region.

The first step in the construction of each of the three trade facilitation indicators is to put all the original data on a comparable basis. This is necessary since some of the data are actual values, some come from surveys where responses can range from 1 to 7, and others from surveys that range from 1 to 10, and so on. To put all original or “raw” data on a comparable basis, each observation of a raw series (which is an observation representing any SADC member) is indexed to the average of all the SADC members’ value for the raw series. That is, each individual SADC member data point is indexed to the average of all SADC members’ data points. Each of these indexed series we shall call an “indexed input.”

So an “indexed input” for SADC member J ($J=1,2, \dots, 15$) is constructed as:

$$\bar{II}_J = II_J / \left(\sum_1^{15} II_J / 15 \right) \quad (5)$$

Where II_J denotes the “raw” data for SADC member J

The next step in creating the trade facilitation indicators involves averaging the indexed inputs into the three specific trade facilitation indicators. A simple average of the indexed inputs is used for transparency of method, and also because there is no specific argument (theoretical or statistical) to choose a different aggregation method². The various raw data series were chosen because of their relevance to the three concepts of trade facilitation.

- **Port Efficiency (PE)** for each SADC member J will be the average of three indexed inputs:
 - i. Port Efficiency Index (MDX).
 - ii. Quality of port infrastructure (GCR)
 - iii. Quality of roads (GCR)
 - iv. Quality of air transport (GCR)
- **Customs Environment (CE)** for each SADC member J will be the average of four indexed inputs :
 - i. Irregular payments and bribes (GCR)
 - ii. Burden of customs procedures (GCR)
 - iii. Prevalence of trade barriers (GCR)
 - iv. Corruption Perceptions Index (Transparency International)
- **E-business (EB)** for each SADC member J will be taken from GCR:
 - i. Number of estimated Internet users per 100 population (GCR)

²The statistical properties of the trade facilitation indicators may require further consideration. The original or raw data come from different metrics (percent, survey ranges from 1 to 7 or 1 to 10, numbers of users, etc). So, the standard deviations around the mean of each of these indicators will differ from the standard deviation of the indexed inputs that they become. When averaged into the trade facilitation indicator, the standard deviation of the final product and its relationship to the standard deviation of the original data is unclear. The implication of this for using the trade facilitation indicators for estimation in the gravity model is also unclear.

3.4.2 Trade flows and other variable

We use bilateral trade flow data available at the Commodity and Trade Database (COMTRADE) of the United Nations Statistics Division. The study used aggregate trade. The data on Gross Domestic Product (GDP) was from the International Monetary Fund (IMF) online database in United States dollars (US\$). Our tariff data was derived from the Trade Analysis and Information System (TRAINS) of the United Nations Conference on Trade and Development (UNCTAD).

We use the weighted average of applied tariff rates where bilateral trade values are used as the weight. Applied tariff records are considerably sparse. In order to avoid a significant loss of observations, we linearly interpolate or extrapolate the applied rates over the period 2000 to 2010 for a given pair of importing and exporting countries when records for at least two years are available. The weighted distance between countries' major economic cities, as well as information on partners' languages and border are all taken from (<http://www.cepii.fr>). Table 3 provides the various data sources used in the empirical section of this research.

Table 3: Data sources

	Name of data used	Source(s)
1	Port Efficiency (PE)	MXD and GCR
2	Customs Environment (CE)	GCR and TI
3	E-business Usage (EB)	GCR
4	Exporter	IMF database
5	Importer GDP	IMF database
6	Distance	http://www.cepii.fr
7	Language	http://www.cepii.fr
8	Adjacent (border)	http://www.cepii.fr
9	RTA dummy	http://www.cepii.fr

Source: Author compilation

Notes: MXD = Maritime Transport Costs and Port Efficiency, World Bank Group

GCR = World Economic Forum Global Competitiveness Report

TI = Transparency International

4 Results

4.1 Gravity trade model estimations

Table 4 shows the regression results based on Equation (4). Given that the study's main aim is to investigate trade facilitation, the procedure employed in this research to generate a set of distinct trade facilitation indicators and further include them in a gravity model of trade is generally successful. Most of the coefficients for the three trade facilitation measures are generally significant and have the expected sign (with the exception of importer's customs environment). The simulated coefficients vary across the different trade facilitation indicators. From a policy perspective, these differences in estimated elasticities of trade flows with respect to trade facilitation indicator implies that different approaches to trade

facilitation will differentially affect exports of individual countries and of the SADC region as a whole.

Overall, the study's analysis indicates the fact that trade facilitation involves more than reducing the commonly cited problem in SADC trade, which is cost of transportation, although this factor is also quite important. The tabulated results indicate that, and as also alluded to by Wilson et al (2003), other empirical studies on quantifying the benefits of trade facilitation that solemnly used transport costs as a proxy for trade facilitation likely underestimated the elasticity of trade with respect to broad trade facilitation efforts. This is an important first consideration for policymakers as they consider trade and development priorities in the future.

Tariffs, though they have an unexpected positive sign, are however not significant and as such, they do not play any significant effect on intra-SADC trade. The fact that tariffs do not affect intra-regional trade is not a surprise given that all member countries³ in the gravity trade model sample have been implementing tariff phase downs which started in 2000. These tariff phase downs resulted in SADC becoming a free trade area in 2008. Thus, most import duties for the period understand (2006 to 2010) were nearly, (if not totally), zero for goods originating in SADC countries.

Table 4: Regression results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	5.32	12.84	0.41	0.6789
Tariff	4.21	2.73	1.54	0.1235
Port Efficiency (Importer)	0.71	0.55	1.28	0.2009
Port Efficiency (Exporter)	1.34	0.59	2.27	0.0239
Customs Environment (Importer)	-2.03	1.09	-1.85	0.0645
E-business Usage (Importer)	0.43	0.13	3.31	0.0010
E-business Usage (Exporter)	0.31	0.12	2.70	0.0072
Exporter GDP	1.50	0.09	16.02	0.0000
Importer GDP	1.19	0.07	16.58	0.0000
Distance	-3.32	0.24	-14.07	0.0000
Language	1.52	0.21	7.26	0.0000
Common border	1.11	0.24	4.57	0.0000
Number of observations	580			
Adjusted R ²	0.671			
F-Test	108			

Source: Author simulations

Port efficiency for the exporting country has one of the largest elasticity among the trade facilitation indicators, about 1.34. In this instance, a percentage point increase in exporter's port efficiency will result in 1.34% increase in regional-intra export trade (*ceteris paribus*). These results are relatively compared to Wilson et al (2005) who found that a percentage increase in exporting country's port efficiency led to increase intra – APEC trade by 0.924%. Policy wise, this implies that the greatest gains to intra-SADC exports trade would come from improvements in this dimension of trade facilitation. Although the importer port

³DRC, Madagascar and Seychelles are not included in the empirical model since they are yet to join the SADC free trade area (FTA)

efficiency coefficient is positive, it is however not significant. Whilst this is not expected, the study is of the idea that within the SADC region, more than 75% of trade (whether exports or imports) are done with one member country, South Africa. At the same time, South African ports are generally considered relatively efficient when compared to ports in other member countries. Hence, the efficiency of South African ports in comparison to other regional ports may not be of much concern in intra-regional trade as they perform above average.

E-business usage, both for the exporter and importer has a positive and significant effect on intra-SADC export trade. The coefficients, though relatively small, suggests that the benefits of having facilitating domestic infrastructures and increasing engagement in ecommerce are very important in enhancing intra-regional trade. Specifically, a percentage increase in use of e-business in both importing and exporting SADC countries will cause intra-regional export trade to increase by 0.43% and 0.31%, respectively. In other words, the opportunities for increased trade from improvements in this measure of trade facilitation are also significant. These findings are in congruent with Fink et al (mimeo) study which found that good telecommunications and greater access to the internet normally increase bilateral trade flows.

Customs environment of the importing country is significant, but have a wrong sign. This is a bit surprise given that the customs environment in the region is generally weak as witnessed by rampant irregular payments and bribes in most borders; burdensome customs procedures where some retailers may need more than 40 customs documents to clear goods across one border; and a host of non-trade barriers (NTBs) currently being implemented by most member countries.

Considering the traditional gravity trade model variables, a 1% increase in *gross domestic product* (GDP) of both the exporter and importer countries will increase intra-SADC export trade by 1.5% and 1.19%, respectively. This positive relationship is, as pointed earlier, according to theoretical expectations. These results compare well with the findings of most studies on gravity equations estimated on trade, including a study by Chan-Hyun (2001), Jayasinghe and Sarker (2007) and Rojid (2006). The Chan-Hyun study showed that Korea's exportation was, among other factors, propagated by both the importers' and exporter's GDPs. In particular, the paper found that a 1% increase in the product of Korea's GDP and the GDP of any of its trading partners resulted in an increase in mineral exportation by 1.1%. In the case of the Jayasinghe and Sarker's (2007) study, a 1% increase in the GDPs of the exporter and importer trading partners increased the export trade of the exporting partner by 8.24% and 17.49%, respectively. Finally, Rojid's (2006) findings showed that a 1% increase in GDP of both the importing and exporting trading partners increase export trade of the exporting partner by 0.9% and 0.8%, respectively.

The negative coefficient on *distance* is according to theoretical expectation, whereby an increase in distance will increase such things as transaction and transportation costs, among other expenses, thus resulting in a reduction in exports of meat and meat products. According to Table 4, a 1% increase in distance reduces intra-SADC export trade by 3.3%. Previous studies by Marques (2008), Kandogan (2008), Baier and Bergstrand (2005), among others, also found a negative sign for the coefficient of distance in their respective gravity trade equations.

The coefficient of *common border* is positive and statistically significant at one percent level of significance. This, as said before, is according to theoretical expectations which assumes

that countries which shares a common border are more likely to trade with each other than countries which do not share a common border.

4.2 Trade potential estimations

After estimating the gravity model for intra-trade among the SADC countries, the paper proceeds to estimate the trade potential for each of the reporting SADC member state. Table 5 presents the intra-trade potentials (measured by the ratio P/A) within SADC region at country level (Further country level simulations are presented in Table A1 in Annex). For a country like Botswana, the country has ratio values of greater than one with 11 out of the 12 SADC trading partners (except Zimbabwe), with the highest unrealized trading potential suggested with Madagascar. In this case, Botswana tabulated information shows that Botswana and its 11 SADC trading partners are trading much less than what the gravity model predicts and this implies that Botswana has untapped trade with countries. This scenario suggests that it will be to the advantage of Botswana if the country continues to make all efforts to improve trade facilitation efforts. The benefits of trade facilitation will be further enhanced if, on the other hand, the 11 SADC member countries with which Botswana has untapped trade potential also implement regulations to improve trade facilitation from their respective trade regimes.

Table 5: Average (2006 – 2010) trade potentials with within SADC countries in ratios (P/A)

Reporter/Partner	ANG	BW	LSO	MAD	MAU	MOZ	MWI	NAM	RSA	SWZ	TZA	ZAM	ZW
Botswana	7.2	-	22.2	142.4	2.7	1.8	1.8	3.4	20.6	23.6	2.1	2.9	0.9
Madagascar	12.7	65.1	7.1	-	0.3	0.9	63.2	10.1	0.5	15.7	2.4	3.7	2.1
Mauritius	0.2	4.1	18.4	0.1	-	0.2	3.7	34.9	0.6	145.7	1.6	2.4	0.6
Mozambique	1.6	9.9	34.2	0.7	0.2	-	0.1	21.9	0.4	5.2	1.5	1.4	0.1
Malawi	311.5	0.5	15.6	13.6	1.6	72.5	-	4.0	0.4	0.6	1.3	1.8	0.3
Namibia	0.1	3.4	2.2	7.3	0.4	0.0	3.5	-	1.5	0.6	0.9	1.5	0.2
South Africa ⁺	0.5	-	-	0.2	0.3	0.5	0.5	-	-	-	0.5	0.8	4.6
Tanzania	1.1	11.9	87.4	0.1	0.5	0.1	0.6	2.2	0.2	0.5	-	0.8	2.5
Zambia	23.2	4.4	1.1	15.8	1.6	3.2	0.8	1.5	0.6	0.7	1.0	-	4.0
Zimbabwe	1.2	1.6	0.4	5.5	0.1	0.1	0.3	0.4	0.9	0.5	1.8	2.3	-

Source: Author computations

Key: ANG=Angola; BW= Botswana; LSO = Lesotho; MAD=Madagascar; MAU = Mauritius; MOZ= Mozambique; MWI = Malawi; NAM= Namibia; RSA = South Africa; SWZ = Swaziland; TZA = Tanzania; ZAM = Zambia; ZW = Zimbabwe

⁺ = The database combined BW, LSO, NAM and SWZ data in South Africa trade follows

A closer look at South Africa shows that the country has exhausted its trade potential with almost all reported trading partners, with the exception of Zimbabwe. These results may not be a surprise given that most of the trading partners which trade with South Africa, export to and import from South Africa more than the latter country export to and import from them. Furthermore, given that South Africa's trade facilitation mechanisms are relatively efficiency compared to its trading partners, any further improvement from the side of South Africa will not have much significant marginal positive impact on the current trade. Thus, the results indicates that in general, improvement in trade facilitation mechanisms will not be beneficial

very much from South African side given that the country has already exhausted its trade potential with the respected SADC countries. Thus, South Africa will do best to maintain the level of trade with these trading partners.

Table 6 shows trade potentials among the country reporters and their respective SADC regional partners, in value (US\$ millions). For each reporter country, there are three rows, *A*, *P* and *Diff*, where the first implies actual trade which took place, while the second (*P*) indicates the simulated potential trade with the gravity model, and the last (*Diff*) is the difference between the two ($P - A$). In the case of *Diff*, a positive value suggests existence of unrealized (or untapped) potential, while a negative value suggests evidence of exhausted potential. Overall, and by focusing on *Diff* row, Table 6 shows mixed results, as some reporting countries seems to have exhausted their trade potentials, while others are still indicated as having untapped trade potentials with their respective regional trading partners. In the case of those with exhausted trade potentials, as indicated by negative value of *Diff*, that will imply that the reporting country and her regional trading partners are trading more than the gravity model predicts. Information from Table 6 indicates that countries such as South Africa and Zimbabwe, among others, have exhausted their respective trade potentials with regional trading partners. Exhaustion of trade potentials is an indication of a successful partnership among trading countries (International Trade Centre (ITC) (2005, 2003). Exhaustion of trade potential does not imply that these countries should not trade, but only implies that it may be difficult to increase the levels of trade between such trading partners. As such, the best that can be done especially by the reporter partners is to ensure they try to maintain that level of trade.

On the other hand, and following the International Trade Centre (ITC) (2005, 2003), evidence of unrealized (or untapped) trade in turn implies the potential for the reporting SADC country to expand its trade with member countries in question. Tabulated information shows that countries such as Botswana and Madagascar, among others, had untapped trade potentials with more than seven of the regional trading partners. Thus those countries with unrealized trade potential should continue endeavours to improve their trade facilitation (among other issues to be improved). The potential to trade will be even further enhanced if all the member countries which have been indicated as having untapped trade potential with the reporting SADC reporting countries also improve on their trade facilitation.

Table 6: Average (2006 – 2010) Trade potentials within SADC countries in value (US\$m) (P – A)

Reporter/Partner		ANG	BW	LSO	MAD	MAU	MOZ	MWI	NAM	RSA	SWZ	TZA	ZAM	ZW
Botswana	A	2.4	-	0.5	0.0	0.7	2.6	1.7	21.7	563	1.1	1.6	37.1	230
	P	5.4	-	7.4	0.2	0.5	2.7	2.9	53.8	10,872	23.8	2.4	82.3	197
	Diff	3.0	-	6.9	0.2	-0.3	0.1	1.2	32.1	10,309	22.7	0.8	45.2	-33.3
Madagascar	A	0.03	0.01	0.01	-	16.5	0.3	0.01	0.02	11	0.03	0.25	0.13	0.12
	P	0.2	0.1	0.0	-	4.4	0.3	0.1	0.0	5	0.1	0.3	0.1	0
	Diff	0.2	0.1	0.0	-	-12.1	0.0	0.1	0.0	-6	0.0	0.0	0.0	0.0
Mauritius	A	2.0	0.2	0.8	99.6	-	1.4	0.4	0.1	68	0.0	1.1	0.9	1.3
	P	0.3	0.6	0.1	11.1	-	0.2	0.4	0.3	43	0.4	1.4	0.8	0.7
	Diff	-1.7	0.4	-0.8	-88.5	-	-1.2	0.1	0.2	-26	0.4	0.3	-0.1	-0.6
Mozambique	A	7.0	2.0	0.3	0.6	0.9	-	31.7	0.1	392	2.5	1.6	3.5	75
	P	2.8	1.2	0.1	0.2	0.1	-	2.4	0.2	145	5.2	1.0	3.9	9
	Diff	-4.2	-0.8	-0.2	-0.3	-0.8	-	-29.3	0.1	-247	2.7	-0.7	0.4	-65.9
Malawi	A	0.1	2.4	0.9	0.8	13.3	18.7	-	0.1	110	3.9	12.3	20.9	54
	P	0.5	1.2	0.1	0.1	0.2	2.2	-	0.4	35	0.5	13.8	40.5	11
	Diff	0.4	-1.2	-0.8	-0.7	-13.2	-16.5	-	0.2	-76	-3.4	1.5	19.6	-43.6
Namibia	A	350.5	23.0	0.7	0.0	1.8	20.1	0.6	-	1,451	3.3	1.5	22.7	6
	P	42.6	78.0	1.1	0.1	0.2	0.4	2.3	-	2,174	1.8	1.2	29.1	1
	Diff	-307.9	55.0	0.4	0.0	-1.6	-19.8	1.6	-	723	-1.6	-0.3	6.4	-4.6
South Africa	A	749	-	-	151	325	1,490	383	-	-	-	454	1,583	1,546
	P	356	-	-	26	82	737	192	-	-	-	220	1,284	6,738
	Diff	-394	-	-	-125	-243	-753	-190	-	-	-	-235	-299	5,192
Tanzania	A	2.0	0.8	0.0	4.0	1.3	20.8	30.8	0.7	272	5.2	-	38.5	2
	P	1.5	1.4	0.1	0.3	0.7	1.2	19.2	0.8	55	0.4	-	32.4	3
	Diff	-0.5	0.6	0.1	-3.7	-0.7	-19.5	-11.6	0.1	-216	-4.8	-	-6.1	1.3
Zambia	A	1.5	12.2	1.5	0.6	13.7	2.3	64.4	18.8	508	3.4	37.9	-	81
	P	26.6	49.0	0.5	0.2	0.4	5.0	56.1	18.5	323	2.1	32.4	-	314
	Diff	25.2	36.7	-1.0	-0.5	-13.3	2.7	-8.3	-0.3	-185	-1.3	-5.5	-	233.0
Zimbabwe	A	2.2	141.2	8.1	0.3	2.9	206.6	45.4	10.0	1,167	9.5	7.4	391	-
	P	1.9	75.4	0.6	0.1	0.2	7.6	10.6	2.5	1,084	4.7	2.3	205	-
	Diff	-0.4	-65.8	-7.5	-0.1	-2.7	-199.0	-34.8	-7.5	-82	-4.8	-5.2	-185.9	-

South: Author computations

Key: A = Actual trade flows; P = Potential trade flows as simulated by gravity model; Diff = P – A.

4.2.1 Comparison with other studies

The unrealized export potential results are not unique to the findings of this study, but compare well with other previous studies which found existence of both untapped potential and exhausted trade potential with the SADC region. The study by Simwaka (2011) found that intra-regional trade in SADC region was lower than its potential, thus implying existence of trade potential in the sub-region. Evans (1997) found that SADC FTA was likely to lead to trade creation, and African Development Bank (1993) found that there is considerable potential for the non-Southern African Customs Union (SACU) countries to switch supply from third countries to South Africa. To the contrary, researches by both Chauvin (2002) and Cassim (2001) indicated that SADC trade potentials were rather small; implying that trade potential had been exhausted. Lastly, the Elbadawi (1997) paper which was conducted before the implementation of the SADC tariff phase down indicated that SADC did not have a significant effect on trade among its members.

5.1 Conclusions

The following are the conclusions that emanated from the empirical evidence of this study:

Gravity trade model

- a) Tariffs, though they have an unexpected positive sign, are however not significant and as such, they do not play any significant effect on intra-SADC trade. The fact that tariffs do not affect intra-regional trade is not a surprise given that all member countries in the gravity trade model sample have been implementing tariff phase downs which started in 2000.
- b) *Port efficiency* for the reporting country has been found to be among the significant trade facilitation indicators, with a percentage point increase in the reporter's port efficiency resulting in 1.34% increase in regional-intra export trade (*ceteris paribus*).
- c) *E-business usage*, both for the exporter and importer has a positive and significant effect on intra-SADC export trade, suggesting that the benefits of having facilitating domestic infrastructures and increasing engagement in ecommerce are very important in enhancing intra-regional trade. Specifically, a percentage increase in use of e-business in both importing and exporting SADC countries will cause intra-regional export trade to increase by 0.43% and 0.31%, respectively. In other words, the opportunities for increased trade from improvements in this measure of trade facilitation are also significant.
- d) Considering the traditional gravity trade model variables, a 1% increase in *gross domestic product* (GDP) of both the exporter and importer countries was found to increase intra-SADC export trade by 1.5% and 1.19%, respectively. This positive relationship is, as pointed earlier, according to theoretical expectations.

- e) *Distance* was found to negatively affect intra-regional trade, and this is according to theoretical expectation, whereby an increase in distance will increase such things as transaction and transportation costs, among other expenses, thus resulting in a reduction in exports of meat and meat products. According to Table 4, a 1% increase in distance reduces intra-SADC export trade by 3.3%.
- f) The coefficient of *common border* was found to be positive and statistically significant at one percent level of significance. This, as said before, is according to theoretical expectations which assumes that countries which shares a common border are more likely to trade with each other than countries which do not share a common border.

Trade potential

Overall, the potential trade simulations shows mixed results, with some reporting countries seems to have exhausted their trade potentials, while other still indicated as having untapped trade potentials with their respective regional trading partners. Information from Table 6 indicates that countries such as South Africa and Zimbabwe, among others, have exhausted their respective trade potentials with regional trading partners. On the other hand, the same table shows that countries such as Botswana and Madagascar, among others, had untapped trade potentials with more than seven of the regional trading partners. Exhaustation of trade potentials is an indication of a successful partnership among trading countries (International Trade Centre (ITC) (2005, 2003). Exhaustation of trade potential does not imply that these countries should not trade, but only implies that it may be difficult to increase the levels of trade with such trading partners. As such, the best that can be done especially by the reporter partners is to ensure they try to maintain that level of trade. Those countries with unrealized trade potential should continue endeavours to improve their trade facilitation (among other issues to be improved). The potential to trade will be even further enhanced if all the member countries which have been indicated as having untapped trade potential with the reporting SADC reporting countries also improve on their trade facilitation.

References

Anderson, J.E. (1979), 'A Theoretical Foundation for the Gravity Equation, *American Economic Review*, Vol. 69, No. 1, 106 – 116.

African Development Bank. 2000. *African Development Report*. New York: Oxford University Press.

Asian-Pacific Economic Co-operation (APEC). (2003), 'Trade Facilitation Measures in ASEAN: Reducing Transaction Costs and Enhancing Trade Efficiency', Association of South East Asian Nations.

Asian-Pacific Economic Co-operation (APEC). (2002), 'Measuring the Impact of APEC Trade Facilitation on APEC Economies: A CGE Analysis', APEC Economic Committee, Bangkok.

Asian-Pacific Economic Co-operation (APEC). (2002, 'Economies: Realizing the Benefits of Trade Facilitation', Report Prepared for APEC Ministerial Meeting, Mexico 2002.

Asian-Pacific Economic Co-operation (APEC). (1999), 'Assessing APEC Trade Liberalization and Facilitation: 1999 Update', Economic Committee, September 1999. APEC: Singapore.

Asia Pacific Foundation of Canada (1999), 'Survey on Customs, Standards and Business Mobility in the APEC Region', APF Canada: Vancouver.

Australian Department of Foreign Affairs and Trade and Chinese Ministry of Foreign Trade and Economic Cooperation (2000), 'Paperless Trading: Benefits to APEC. Commonwealth of Australia', URL: http://www.dfat.gov.au/publications/paperless/paperless_trading.pdf.

Cassim R. (2001), 'The Determinants of Intra regional Trade in Southern Africa with specific reference to South Africa and the Rest of the Region,' DPRU Working Paper 01/51, University of Cape Town.

Chauvin, S. and G. Gaulier, (2002), 'Regional Trade Integration in Southern Africa,' CEPPI, Working paper No. 2002-12

Eita, J. H. and Andre, C. J. (2007), 'South Africa Exports of Metal and Articles of Base Metal: A Gravity Model Approach', *Journal of Studies in Economics and Econometrics*, Vol. 31, No. 3, 81 - 96.

Elbadawi, I. (1997), 'The Impact of Regional Trade/Monetary Schemes on Intra-Sub-Saharan African Trade, Unpublished Mimeo, AERC, Kenya.

Evans, D (1997), 'The Uruguay Round and the Free Trade Area of the Southern African Development Community SADC', Draft. Mimeo, Institute of Development Studies, University of Sussex.

European Commission. (EC). (1989), 'COST 306 Final Report', Brussels.

Fink, C., Matoo, A. and Neagu, C. I. (2002), 'Trade in International Maritime Services: How Much Does Policy Matter?' *World Bank Economic Review*, Vol. 6, No. 1, 81-108.

Fink, C., Matoo, A. and Neagu, C. (mimeo), "Assessing the Role of Communication Costs in International Trade", The World Bank: Washington, D.C.

Grainger, A. (2011), 'Developing the case for trade facilitation in practice', *World Customs Journal*, Vol. 5, No. 2.

Haralmbides, H. and Londono-Kent, P. (2002), 'Impediments to Free Trade: The Case of Trucking and NAFTA in the U.S.-Mexican Border'. Mimeo, Erasmus University, Rotterdam.

Jayasinghe, S. and Sarker, R. (2007), 'Effects of Regional Trade Agreements on Trade in Agrifood Products: Evidence from Gravity Modeling Using Disaggregated Data', *Review of Agricultural Economics*, Vol. 30, No. 1, 61-81

Japan External Trade Organization (JETRO). (2002), 'Report on Market Access to Japan: Single Windows for Trade and Port-related Procedures', Tokyo, Japan.

Layton, B. (2007), Trade facilitation: A study in the context of the ASEAN Economic Community Blueprint', In "*Deepening Economic Integration in East Asian – The ASEAN Economic Community and Beyond*" (Eds) Soesastro.

Japan's Ministry of Economics, Trade and Industry (METI). (1998), 'Report on Asia-scale Industrial Structure Policies', Tokyo, Japan.

Moenius, J. (2000), 'Three Essays on Trade Barriers and Trade Volumes', Ph.D. dissertation, University of California, San Diego.

Organization for Economic Co-operation and Development (OECD). (2005), 'The costs and benefits of trade facilitation', OECD Observer Policy Brief.

Organization for Economic Co-operation and Development (OECD). (2003), 'Quantitative assessment of the benefits of trade facilitation', TD/TC/WP (2003)31/FINAL.

Organization for Economic Co-operation and Development (OECD). (2001), 'Business Benefits of trade Facilitation', TD/TC/WP(2001) FINAL. OECD: Paris.

Otsuki, T., Wilson, J.S and Sewadeh, M. (2001a), 'What Price Precaution? European Harmonisation of Aflatoxin regulations and African groundnut exports', *European Review of Agricultural Economics*, Vol. 28, No. 3, 263-284.

Otsuki, T., Wilson, J.S and Sewadeh, M. (2001b), 'Saving Two in a Billion: Quantifying the Trade Effect of European Food Safety Standards on African Exports', *Food Policy*, Vol. 26.

Poyhonen, P (1963), 'A Tentative Model for the Volume of Trade between Countries, *Weltwirtschaftliches Archiv*, Vol. 90, 23-40.

Rojid, S. (2006), 'COMESA Trade Potential: A Gravity Approach', *Applied Economic Letters*, Vol. 13, 947-951.

Simwaka, K. (2011), 'An empirical evaluation of trade potential in Southern African Development Community', African Economic Research Consortium Research paper, No. 235

Tinbergen, J (1962), 'An Analysis of World Trade Flows'. In Tinbergen, J. (ed) *Shaping the World Economy*. New York: The Twentieth Century Fund.

United Nations Conference on Trade and Development (UNCTAD). (1994), 'Fact Sheet 5', United Nations International Symposium on Trade Efficiency (17-21 October). Geneva.

United States National Committee on International Trade Documentation (US-NCITD). (1971), 'Paperwork or Profits in International Trade', Washington, D.C.

Wilson, J. S., Mann, C. L and Otsuki, T. (2005), *Assessing the benefits of trade facilitation: A global perspective*, Blackwell Publishing Ltd, p: 841- 871.

Wilson, J. S., Mann, C. L and Otsuki, T. (2003), 'Trade facilitation and economic development: Measuring the impact', World Bank Policy Research Working paper 2988

World Bank (2012), '*Ease of Doing Business*', Washington, D.C.: World Bank.
www.doingbusiness.org/data/exploretopics/trading-across-borders.

ANNEX 1: SADC countries' trade potentials

Table A1: Trade potentials with within SADC countries in ratios (P/A)

Panel A

		2006	2007	2008	2009	2010	Average			2006	2007	2008	2009	2010	Average
Botswana's potential with...	Angola	0.5	4.3	1.6	5.6	24.1	7.2	Madagascar's potential with...	Angola	0.5	10.1	16.2	22.1	14.4	12.7
	Lesotho	30.3	39.6	7.1	14.6	19.4	22.2		Bots	22.3	71.9	128.8	99.5	2.7	65.1
	Madagascar	83.7	138.8	270.9	8.8	209.7	142		Les	0.3	0.8	2.0	13.1	19.3	7.1
	Mauritius	0.3	0.9	0.3	2.7	9.5	2.7		Mauritius	0.1	0.2	0.4	0.3	0.3	0.3
	Mozambique	1.4	4.1	1.2	0.5	1.6	1.8		Mozambique	0.3	0.6	0.7	1.1	1.4	0.9
	Malawi	1.6	2.6	1.3	1.4	2.2	1.8		Malawi	6.4	46.8	31.3	4.7	226.9	63.2
	Namibia	2.6	5.1	1.0	2.6	5.7	3.4		Nam	0.2	16.5	1.1	31.5	1.1	10.1
	South Africa	26.1	18.8	11.8	16.4	30.0	20.6		South Africa	0.5	0.6	0.5	0.4	0.5	0.5
	Swazi	36.2	17.4	17.1	12.9	34.5	23.6		Swazi	27.9	36.5	2.6	10.1	1.4	15.7
	Tanzania	1.8	3.8	1.0	2.6	1.2	2.1		Tanzania	0.5	3.8	0.4	3.2	4.2	2.4
	Zambia	2.8	5.9	2.0	1.2	2.6	2.9		Zambia	6.9	3.2	3.9	0.3	4.0	3.7
Zimbabwe	0.8	0.6	0.7	1.0	1.6	0.9	Zimbabwe	1.0	0.5	2.3	1.7	5.1	2.1		

Panel B

		2006	2007	2008	2009	2010	Average			2006	2007	2008	2009	2010	Average
Mauritius's potential with...	Angola	0.0	0.1	0.6	0.1	0.2	0.2	Mozambique's potential with...	Angola	0.6	0.1	0.3	0.5	6.3	1.6
	Botswana	2.2	4.5	2.7	3.9	7.1	4.1		Botswana	1.0	2.2	0.1	5.9	39.9	9.9
	Lesotho	0.1	0.0	0.1	0.1	91.7	18.4		Lesotho	0.1	0.1	3.7	1.9	165.4	34.2
	Madagascar	0.0	0.1	0.1	0.1	0.3	0.1		Madagascar	0.4	0.1	0.6	0.7	1.7	0.7
	Mozambique	0.1	0.3	0.1	0.1	0.2	0.2		Mauritius	0.0	0.1	0.3	0.4	0.1	0.2
	Malawi	7.5	0.4	0.5	5.9	4.3	3.7		Malawi	0.0	0.0	0.0	0.1	0.2	0.1
	Namibia	161.7	2.2	3.9	3.6	3.2	34.9		Namibia	1.4	87.3	0.5	14.4	5.8	21.9
	South Africa	0.6	0.7	0.7	0.4	0.8	0.6		South Africa	0.2	0.2	0.6	0.4	0.5	0.4
	Swazi	1.9	23.0	54.3	71.7	578	146		Swazi	0.3	3.7	11.6	5.8	4.7	5.2
	Tanzania	0.6	1.2	0.9	1.3	4.0	1.6		Tanzania	0.1	1.3	0.9	4.6	0.7	1.5
	Zambia	0.5	0.4	0.8	1.2	9.5	2.4		Zambia	0.7	1.0	0.8	0.9	3.5	1.4
	Zimbabwe	0.4	0.6	0.9	0.4	0.8	0.6		Zimbabwe	0.1	0.1	0.1	0.2	0.2	0.1

Panel C

		2006	2007	2008	2009	2010	Average			2006	2007	2008	2009	2010	Average
Malawi's potential with...	Angola	95.0	0.5	440.9	7.1	1014.1	312	Namibia's potential with...	Angola	0.1	0.2	0.1	0.1	0.2	0.1
	Botswana	0.2	0.3	0.5	0.4	1.2	0.5		Botswana	3.6	3.2	3.0	2.5	4.8	3.4
	Lesotho	0.0	0.0	0.0	77.5	0.3	15.6		Lesotho	5.4	1.0	1.1	1.3	2.0	2.2
	Madagascar	0.0	0.0	66.2	1.2	0.3	13.6		Madagascar	21.2	2.1	4.2	3.9	5.3	7.3
	Mauritius	0.7	0.3	1.3	0.0	5.6	1.6		Mauritius	0.9	1.0	0.1	0.1	0.1	0.4
	Mozambique	0.0	0.0	0.1	362.3	0.1	72.5		Mozambique	0.0	0.0	0.0	0.0	0.0	0.0
	Namibia	0.3	3.8	4.8	4.1	6.8	4.0		Malawi	2.2	4.8	2.5	3.4	4.6	3.5
	South Africa	0.1	0.1	0.4	0.4	1.2	0.4		South Africa	1.9	1.7	1.3	1.0	1.8	1.5
	Swazi	0.8	1.9	0.1	0.1	0.2	0.6		Swazi	0.9	0.5	0.3	0.4	0.7	0.6
	Tanzania	0.5	0.5	0.5	1.6	3.5	1.3		Tanzania	0.9	1.2	0.6	0.7	0.9	0.9
	Zambia	0.7	0.7	3.0	2.3	2.4	1.8		Zambia	2.4	1.9	1.1	0.8	1.5	1.5
	Zimbabwe	0.2	0.0	0.4	0.4	0.4	0.3		Zimbabwe	0.3	0.3	0.1	0.2	0.3	0.2

Panel D

		2006	2007	2008	2009	2010	Average			2006	2007	2008	2009	2010	Average
South Africa's potential with...	Angola	0.3	0.4	0.4	0.5	0.8	0.5	Tanzania's potential with...	Angola	0.2	0.5	1.1	2.9	0.8	1.1
	Madagascar	0.2	0.1	0.1	0.2	0.2	0.2		Botswana	15.6	21.4	6.9	0.4	15.0	11.9
	Mauritius	0.2	0.3	0.2	0.2	0.3	0.3		Lesotho	65.5	48.4	74.4	100.4	148.0	87.4
	Mozambique	0.4	0.4	0.5	0.5	0.6	0.5		Madagascar	0.1	0.1	0.1	0.1	0.0	0.1
	Malawi	0.3	0.4	0.3	0.5	0.9	0.5		Mauritius	0.4	0.3	0.9	0.5	0.6	0.5
	Tanzania	0.3	0.4	0.4	0.5	0.7	0.5		Mozambique	0.0	0.0	0.0	0.1	0.1	0.1
	Zambia	0.7	0.6	0.7	0.7	1.2	0.8		Malawi	0.3	0.4	0.3	1.1	1.0	0.6
	Zimbabwe	6.0	6.3	3.0	3.0	4.5	4.6		Namibia	1.1	4.7	2.2	0.4	2.5	2.2
									South Africa	0.1	0.2	0.2	0.3	0.2	0.2
							Swazi	0.1	1.2	0.4	0.0	0.6	0.5		
							Zambia	0.9	0.8	0.7	0.7	1.1	0.8		
							Zimbabwe	2.3	4.3	1.9	0.6	3.5	2.5		

Panel E

		2006	2007	2008	2009	2010	Average			2006	2007	2008	2009	2010	Average
Zambia's potential with...	Angola	29.9	35.6	22.2	13.0	15.4	23.2	Zimbabwe's potential with...	Angola	2.9	1.3	0.5	0.7	0.8	1.2
	Botswana	4.9	1.7	6.4	3.9	5.3	4.4		Botswana	0.2	0.3	0.3	1.9	5.0	1.6
	Lesotho	0.1	0.3	0.7	1.1	3.6	1.1		Lesotho	1.5	0.1	0.3	0.0	0.1	0.4
	Madagascar	62.0	3.3	13.2	0.1	0.6	15.8		Madagascar	1.1	0.1	1.9	4.0	20.4	5.5
	Mauritius	0.3	7.7	0.0	0.0	0.0	1.6		Mauritius	0.1	0.1	0.1	0.1	0.1	0.1
	Mozambique	2.0	2.1	8.4	1.8	1.6	3.2		Mozambique	0.0	0.0	0.1	0.1	0.1	0.1
	Malawi	0.3	0.7	0.9	0.9	1.2	0.8		Malawi	0.1	0.1	0.1	0.6	0.6	0.3
	Namibia	0.5	0.3	2.2	2.8	1.7	1.5		Namibia	0.1	0.1	0.2	0.7	0.9	0.4
	South Africa	0.5	0.4	0.7	0.6	0.9	0.6		South Africa	0.8	0.8	1.0	0.9	1.1	0.9
	Swazi	1.3	0.4	0.6	0.5	0.8	0.7		Swazi	1.0	0.4	0.4	0.4	0.5	0.5
	Tanzania	0.9	0.2	1.1	1.0	1.8	1.0		Tanzania	0.4	0.1	1.2	5.0	2.5	1.8
	Zimbabwe	4.9	3.3	4.4	3.1	4.1	4.0		Zambia	0.1	1.3	2.4	2.5	5.2	2.3