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Foreword

The Economic Policy Research Network (EPRN Rwanda) is a Non-Governmental Organization aiming at strengthening the capacities of individuals and organizations active in or with an interest in economic policy research and analysis. EPRN Rwanda therefore responds to economic policy gaps resulting mainly from lack of quality and informative research and the challenge of human capacity in terms of limited numbers of economic researchers and active involvement.

The mission of EPRN Rwanda is to contribute to the evidence based economic policy making by providing high quality research, building capacity and creating networking opportunities.

One of the flagship activities of EPRN is the Annual Economic Research Conference. This year, EPRN in collaboration with GIZ, UNECA, UNDP and other partners organized the 5th Economic Research Conference on 12th March, 2019 at Kigali Convention Centre. This was a high-level interactive research conference and convened about 200 participants, including researchers, senior policy-makers, representatives of the development partners, civil society, private sector and the media.

The Central theme for the 5th Conference was **“The African Continental Free Trade Area: Challenges and Opportunities”**.

This publication contains a number of research findings and policy recommendations from selected papers which were developed and presented through EPRN Annual Research Conferences.

The paper on “Regional Trade and Competitiveness of Rwandan Agriculture: Empirical Analysis of Selected Priority Foodstuffs” aims at investigating the impact of regional integration on the agricultural trade development by focusing on wheat flour, maize grain, maize flour, potato, rice and soybean, fresh bean and dried beans sectors selected among priority foodstuffs in Rwanda.

The paper on “The effect of human capital development on economic growth in Rwanda” examines the effect of human capital development on economic growth in Rwanda. The paper used the data collected from mostly public institutions for variables Gross Domestic Product, Public Expenditure on Education, Public Expenditures on Health, Primary School Enrolment, Secondary school Enrolment and Tertiary School Enrolment spanning from 2004 to 2018.

The paper on “The Effect of Human Capital on Performance of Small and Medium Manufacturing Companies in Rwanda: A Mediating Role of Innovation Capability” investigates the human capital-performance nexus with a mediating role of innovation among small and medium manufacturing companies in Rwanda. More specifically, the study sought to determine the effect of human capital on firm performance, to determine the effect of human capital on innovation and to establish the mediating role of innovation in the relationship between human capital and firm performance.

A paper on “Can Rwanda Benefit from East African Monetary Union Adoption?” The Empirical analysis of this study has two main sections, the first section consist of the feasibility and implication of the East African Community Monetary Union and the second section seek to establish whether the EAC setup of monetary union policy with EAC member countries can affect Rwandan trade flows growth as a whole with its African trade partners in the context of a dynamic stochastic general equilibrium trade model.

A paper on “Rwanda in Africa continental free trade area: challenges-opportunities analysis” aims at assessing the challenges-opportunities from Rwanda industrialization, labor productivity and competitiveness, then finding out the required policy actions to allow Rwanda competing profitably in AfCFTA.

A paper on “The effect of trade credit on financial performance of manufacturing Small and Medium Enterprises (SMEs) in Rwanda” examines the effect of trade credit on financial performance of manufacturing SMEs in Kigali City the capital of Rwanda.

EPRN Rwanda expresses its gratitude to reviewers of these papers: Prof. Thomas R. Kigabo, Dr. Charles Ruranga, Prof. Alfred R. Bizoza, Dr. Marceline Kamande and Prof Herman Musahara.

Prof. Thomas R. Kigabo

Chairperson, Board of EPRN Rwanda

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Regional Trade and Competitiveness of Rwandan Agriculture: Empirical Analysis of Selected Priority Foodstuffs

By Edouard Musabanganji, Aristide Maniriho, Pascal Kayisire and Christian Nyalihamu

Abstract

This study aims at investigating the impact of regional integration on the agricultural trade development by focusing on wheat flour, maize grain, maize flour, potato, rice and soybean, fresh bean and dried beans sectors selected among priority foodstuffs in Rwanda. This is motivated by the lack of the studies comparing the competitive performance of all priority staple foods sub-sectors in Rwanda in the context of regional trade. The analysis used secondary data obtained through documentary reviews and those collected from the National Bank of Rwanda and FAOSTAT on imports and exports of Rwanda from 2007 to 2017. Apart from the literature review, the analysis was conducted using the Net Export Index (NEI) and the Grubel-Lloyd (GL) measure. The literature review and empirical results reveal that Rwanda benefited from its accession to regional and global trade blocks, especially in terms of the ease of access to external markets through the establishment of the Common Market, the Customs Union and the alleviation of some of trade barriers for basic foodstuffs and consumer goods. The analysis of the Net Export Index and the Grubel-Lloyd measures revealed that Rwanda can have a comparative advantage for wheat flour, fresh beans and dried beans at regional and global markets if measures aiming at developing a dynamic commercial network and improving agricultural value chains productivity are put forward.

Key words: *Regional trade, competitiveness, Rwanda, Agriculture, Potato, Wheat and Bean*

Theme: *The African Continental Free Trade Area: Challenges and Opportunities*

Sub-theme: *Regional integration*

1. Introduction

Agriculture is the backbone of Rwandan economy. This sector needs to be globally competitive to enable the country to have sustainable economic growth and development through the economic independence from the rest of the world. Most of the population is employed in agriculture with more than 85% of all active population in 2012 (Alinda and Abbott, 2012), and around 72% in 2017 (FAO, 2018). This sector also serves as a livelihood source for around 53% independent farmers (NISR, 2018). More than 90% of food consumed in Rwanda is produced by domestic economic operators (RDB, 2012) and considered the cornerstone of food security (RDB, 2012). It contributed 30 per cent to the GDP in 2016 (NISR, 2017) and 33% in 2017 (FAO, 2018). To strengthen its economic development, the Government of Rwanda adopted diverse development initiatives and elaborated different anti-poverty policies and many schemes were initiated. All these policies and schemes were initiated consistent with Rwanda long-term development (Alinda and Abbott, 2012) that also recognized the regional economic integration as one of the significant drivers contributing to the sustainable economic development of the country (MINECOFIN, 2000).

Rwanda got official membership of the East African Community (EAC) in 2007 as the 5th member state after Kenya, Tanzania, Uganda and Burundi, with the purpose of enhancing economic growth and development through the rise of the market share of both agricultural and manufactured products on the EAC market. This has led the country to revise the trade policy, the agriculture development schemes and strategies to account for this important aspect of regional integration, basically its benefits (Musabanganji et al., 2016). The supporters of the regional integration focus on the effects and the costs of Regional Trade Agreements (RTAs) on net trade creation. The RTAs' effects pass through trade liberalization, putting emphasis on the removal of trade barriers that caused waste of resources, as well as the minimization of the costs of market disintegration. They also focused on the investment inflows that are expected to generate increasing net trade gains (Matthew, 2003).

This follows the benefits of regional economic integration such as the expanded market, increased foreign direct investment through the setting up of the best business environment, increased negotiation capacity, development of exchange system, free movement of people, increased efficient use of resources, improved infrastructure, motivation and involvement of the private sector, promote peace and security among others (see Ombeni, 2008; Mwash, 2011; Nene, 2012), which result from the reduction or removal of trade barriers (technical and non-technical barriers) only between the states joining together (Krugman & Obstfeld, 2003). To take delight of these benefits, country members of a community should commit to increase the value of its products, to achieve high diversified economy, and avoid any form of political instability that destroy the industrial sector and thus undermine the agricultural production (Nene, 2012). The free trade, more specifically the international food trade, significantly affect food security of households in member states of a free trade area through the increase supply of foodstuffs and the reduction of seasonal shocks of food supply. The intraregional trade transactions boost the economic growth through increased job creation and the enhancement of income-earning capacities for the poor (Matthews, 2003).

Even though a big number of past regional trade agreements significantly neglected the agricultural trade, agricultural products and specifically food products were classified as sensitive and thus subject to tax exemptions and longer transition periods, among other free trade stimuli (Matthews, 2003).

Besides the very known factors of national competitiveness, namely, economic performance, government efficiency, business efficiency, and infrastructure (Schwab, 2010; Croes, 2011), innovation is also stated as another driver of global competitiveness of a country (Dijkstra et al., 2011; Schwab, 2017). It is enhanced by the skilled people and the access to new inputs (Lopez, 2017). Nowadays, Rwanda is ranked the 58th in competitiveness with GDP per capita of USD 729 out of 135 countries assessed (Schwab, 2017). The more a country is able to efficiently and productively produce a good, the more likely the country will have an absolute and a comparative advantage in the international market (Afzal et al., 2018). This will show the superiority of a country in producing a good or a service (Latruffe, 2017).

For countries to benefit from regional integration and globalization, they must embrace completely changes in production, processing and distribution settings of food products to achieve competitiveness of foodstuffs sector in terms of quantity, quality and price through specialization (Bečvářová, 2008). This is facilitated by the increase in trade openness and the removal of restrictions to local producers on the quantity of goods to be produced and traded, which is coupled with the reduction of tariffs. This will lead to improved home markets, increasing foreign direct investment, and the adoption of high technologies that stimulate the exports given the reduction of the cost (Timoshenko, 2013). It is also important to note that preferential trade arrangements produced both trade creation and trade diversion effects in developing countries. The RTAs led to cost maximization of trade diversion and encouraged the transfer of incomes from the poor to the rich (Matthew, 2003).

Since the new agricultural policy adopted in 2004 (MINAGRI, 2004) that came to complement and support the implementation of regional initiatives to improve staple foods intra-regional trade (MINECOFIN, 2000; Musabanganji et al., 2016), even though numerous transactions on food products were operated within EAC area, the documentation on the benefits of intra-regional trade benefits on agricultural trade development and food security is still scarce. This paper seeks to establish the relationship between the regional trade development and the level of agricultural trade performance of Rwanda. It will analyze agricultural trade flows between Rwanda and regional trade partner countries, and assess the competitiveness of the Rwandan staple foods sectors. The study findings will provide more information to the national planners, agricultural development partners and policy makers to elaborate policy and strategic frameworks. Such policy and strategic frameworks will also be used to (re)define the responsibilities, works and operations of all stakeholders to improve the foods supply chains by strengthening all staple foods sub-sectors so that they become more competitive and able to generate income for producers.

This research on regional trade and competitiveness of Rwandan agriculture with special focus on selected priority foodstuffs is strongly linked to the central theme of the 5th EPRN Conference, the African Continental Free Trade Area: Challenges and Opportunities. It falls directly in the area of economic integration that aims at promoting free movements of goods, labor and capital within the region encompassing a trade bloc whose member countries have signed a free trade agreement (FTA). Even though the African Continental Free Trade Area is currently the priority economic goal of all African political leaders, there are a number of trade blocs that include East African Community (EAC) composed of Rwanda, Burundi, Tanzania, Uganda, Kenya, and South Sudan. This implies that EAC is part of the whole African Continental Free Trade Area. This shows that an analysis of competitiveness within EAC is strongly related to African Continental Free Trade Area (AfCTA).

The study findings will help gain a deeper understanding of trade related aspects, and contribute to the already existing literature, as well as opening door to a range of studies in agricultural economics. The study will also help scaling-up the mode of operation of the staple foods value chains, and upgrading the agribusiness and trade policy framework in Rwanda¹. At the successful completion of this research, it is expected that (1) the level of competitiveness of the Rwandan staple foods sub-sectors on regional and neighboring countries' markets is evaluated, and (2) policy recommendations to guide national planners, agricultural development partners and policy makers are formulated, based on the major findings.

2. Literature Review

2.1. The concept and analysis of competitiveness

The Regional Trade Agreements (RTAs) among competitive and/or complementary countries provide positive short run and long run benefits for member states (McIntyre, 2005). However, Rose (2002) proved that the World Trade Organisation (WTO) member countries behave in the same way as the non-members in terms of trade liberalization. The year 2008 marked the renewal of the role of agriculture as a powerful instrument to raise incomes of extremely poor people, which is boosted by the increase

¹ This research is directly related to AfCTA because countries that perform best as members of regional free trade area may perform better in a continental trade agreement.

in global food prices (WDR, 2008; Byerlee et al., 2012). It was thus decided to find a new orientation of Rwandan agriculture sector and thus move from subsistence agriculture to market oriented agriculture (MINAGRI, 2008; WDR, 2008; Byerlee et al., 2012). This requires adding value to agricultural products, enhancing exports of both traditional and export crops and products through strengthening regional cooperation and integration, as well as economic diplomacy (Republic of Rwanda, 2017).

Rwanda is a growing country in different economic sectors including Agriculture. This sector is considered as a backbone of the economy due to the prominent role it plays in its development. Agriculture production is drastically growing in Rwanda relative to industrial output two decade ago. Although impressive change in agriculture has been registered, Musabanganji et al. (2016) point out that agricultural production is insufficient for the domestic and regional demand. Rwanda mainly export tea and coffee; particularly Rwanda exports of dry beans, potatoes, maize, rice, cassava flour, maize flour, poultry and live animals within Eastern Africa (FAO, 2018). Musabanganji et al (2016) view the benefits of sufficient production as advantage to the competitiveness in the neighboring countries' markets whose access is facilitated by its accession to the EAC. Kerimova, Rakhimzhanova, Beibit and Gulnur (2015) argue that, providing access to markets gives possibility to exploit the full potential of agriculture sector through competitiveness.

Rwanda adopted different mechanism and strategy to promote agriculture by encouraging private sector to increase agriculture production with purpose to promote investment opportunity, national economy performance and potential evidence of competitiveness at regional market. Competitiveness concept is the most common used tool in different economic studies regardless of complexity of definition of "competitiveness" which is not correctly precise according to literature (Siudek and Zawojcka, 2014). However, all ambiguous about the definition of competitiveness, Kerimova, et al. (2015) underlined the importance of competitiveness of agriculture products in providing the significant additional source of production growth, which result in improving the country's food security. Dlamini, Kirsten and Masuku (2014) assessed the fundamental nature and the determinants of competitiveness for the firm to survive in diverse economic situations.

A number of studies used the concept of competitiveness as a reference while analyzing the factors that influence economy at national, regional and globally. For instance, Wigier (2014) adopts competitiveness and efficiency approach to show that farms are primary sources of Polish economic strength. Dlamini, Kirsten and Masuku (2014) identified the factors affecting the competitiveness of the agribusiness sector of Swaziland. Siudek and Zawojcka (2014) mirrored the complexity of the aspects of competitiveness using composite indicators to measure competitiveness. Vavřina and Basovníková (2015) identified suitable financial and nonfinancial instruments to increase the competitiveness of domestic family farms in the context of EU Common Agricultural Policy (CAP) for years 2014–2020. Nivievskyi and Von Cramon Taubadel (2009) proposed computation of competitiveness indicators based on micro-level data to overcome the significant intra-sectoral heterogeneity.

However, despite the empirical studies that highlight the necessity of competitiveness to identify factors that influence different aspect of economy performance, some limitations were pointed out by some findings of researchers. Siudek and Zawojcka (2014) findings highlighted the limitation of the empirical research on competitiveness that is the imperfect comparability of results across studies using different variables (features) that describe competitiveness. Nivievskyi and Von Cramon Taubadel (2009) point out that the measurement of competitiveness in agriculture based on data for average or 'typical' farms are highly heterogeneous; consequently the inferences based on this measurement can be very misleading.

2.2. Regional integration and agricultural competitiveness

Since long, the effects of regional integration and trade liberalization on agricultural development have been discussed. Diao et al. (2001a, b) pointed out that the level of intra-regional agricultural trade is influenced by not only adjacency and trade, but also by transportation cost and/or changes in technology. They showed the importance of regional integration saying that the trade behaviour of a country affects the trade behaviour of its neighbours, then the adoption of the same trade goals and regimes has greater trade effects on neighbouring countries than more distant ones. The common interest is a primary motivation of neighbouring countries to adhere to a regional trade agreement among them.

For countries to make benefits from regional integration and regional trade agreements, they should specialize their production to a certain range of goods and services with respect to available resources (Krugman et al., 2014). While explaining specialization, different researchers have considered different factors related to inter-country differences. These factors include demand and consumer preferences (Davis & Weinstein, 1996; Lundback & Torstensson, 1998), product differentiation and international technology differences (Trefler, 1995), and country-size differences (also known as market-size effect), and factor-endowment differences (e.g., Torstensson 1998). Based on economies of scale and trade costs, it is more likely for a small country to specialize in standardized products in scale-intensive industries, while a large country is likely to be a net exporter (Helpman & Krugman 1985). In countries with low speed of urbanization process, the increase in agricultural exports influences the economic growth than the countries with expanded market demand (Aksoy & Beghin, 2004).

Alongside the Doha Round on trade liberalization, the majority of WTO members prioritized free agricultural trade strategies (Potter & Burney, 2002; Grant & Lambert, 2008). Member states of East African Community (EAC) decided to subsidize the exports of agricultural products to make the sector competitive and thus protect it from industrial countries (McIntyre, 2005), and this decision was in line with their policy on “sensitive items” (see World Bank, 2003) that include agricultural products (milk, palm oil, sugar, rice, wheat, wheat flour) and others (cigarettes, dry cells, garments, used clothes, tires, vehicles, vehicle chassis, etc.). Moschini et al. (2008) proposed three strategies to the member countries to increase their benefits from regional trade agreements: first, competitive provision of quality in agricultural markets through certification; second, subsidize the certification of the high-quality goods; finally, set entry appropriate entry requirements and elaborate trade policies in consideration of the global framework of competition². The trade policies among EAC members resulted in the improvement of intra-regional agricultural trade since agricultural products are among the most traded products within the area, besides manufactured goods and electricity (Castro, 2005).

2.3 Competitiveness of agricultural products versus manufactured products

In some regional trade blocs, the integration has contributed significantly to agricultural development. The exemplary trade area for this concern is the European Union where most attention was given to agriculture in the “Common Agriculture Policy, CAP” (Brouwer & Lowe, 2000). Gorton et al. (2000) revealed that farmers in EU member countries were price-competitive both at world and EU markets, with special reference to cereal producers in Czech Republic and Bulgaria. The continuous support to farmers through the CAP-post 2013 (see European Commission, 2013) continues to boost the agricultural competitiveness in the area. Vavřina and Basovníková (2015) reported that this policy encouraged both small and big farmers to increase their competitiveness thanks to financial and non-financial supports. Cankurt et al. (2013) also pointed to the agricultural competitiveness among the EU member countries through the increase in total factor productivity as a technical change.

As for the manufactured goods, the research reported that the regional integration mostly affected the industrial development in Europe. Baldwin (1989) noted that the market expansion led to higher economic growth rate in the European Union since it influenced the savings and investment in the short run and production scale, consumption size, innovation and profitability in the long run. Sapir (1992) mentioned that the integration process is beneficial not only to the European community but also to her trade partners. He stressed the cases of natural integration where regional partners form a bloc (that is trade liberalization) that is beneficial to the whole world, and the strategic integration that lead some countries to make gains while others make loss. Brühlhart and Torstensson (1996) observed that there was increase in industrial specialization within European countries on the period 1960-1990 as a result of regional integration. As for Smith (2003), he witnessed that the European integration drastically transformed the cloth industry both among the bloc members and in Slovakia. Following the increase in the price of cloths in Western Europe, the traders and households decided to get cloths from the post-communist Eastern Europe where the price was relatively low. You will find more other research that have discussed the effect of integration on the competitiveness of manufactured goods and concluded that the integration process resulted in industrial development in particular and in economic growth in general.

² Moschini et al.'s (2008) suggestion followed the debate on different issues: the WTO negotiations, their implementation and intense disagreements among countries (see Fink & Maskus, 2006); division among countries on agricultural trade and other trade policies (see Josling, 2006); protection of intellectual property (Moschini, 2004); and the necessity to safeguard the culture and preserve traditional methods of production (see Broude, 2005).

In Central America³, agricultural sector has been benefited from protection as part of the intra-regional agricultural trade. The liberalization of regional trade in this area resulted in a net gain for farmers in net exporters and consumers in net importers of the four selected crops, namely rice, sorghum, yellow maize and white maize (Rueda-Junquera, 1998). In North America⁴, the trade exchanges between Canada, Mexico and the United States affected mostly the automobile industry specifically in the 1980s and 1990s through the vital innovations, new markets, new institutional settings and corporate organisations and labour market relations (Carrillo, 2004).

In Eastern and Southern Africa, the research on the effects of COMESA⁵ by Karim and Ismail (2007) indicated an increasing potential for intra-regional agricultural trade for country members and concluded that COMESA members states should set trade policies the encourage regional integration for them to gain the trade benefits and other advantages from this scheme. However, Kenya is said to be not competitive in the wheat sub-sector, the reason why it has requested and applied some protection measures as per the COMESA treaty provisions (Gitau et al., 2010). For the manufactured goods, Tumwebaze and Ijjo (2015) realized that COMESA has no significant effect on economic development of the member countries. They inferred that the economic growth in these countries is rooted from the increase in capital stock, population and trade openness to the rest of the world.

The competitiveness of agricultural products were analysed in ECOWAS⁶ area. Olayiwola et al. (2011, 2015) affirmed that intra-exchange promoted the exports of agricultural products within the sub-region and suggested the strengthening of the trade liberalization and economic facilitation to help the member countries to achieve higher performance of agricultural exports. Odularu (2011) asserted that farmers within ECOWAS area have increased the productivity, improved their level of competitiveness and consequently benefitted the trade gains from accessing European markets through the economic partnership agreements established between ECOWAS and European Union. In this line, Olayiwola and Ola-David (2013) stressed the effect of the growth of agricultural production on the exports and concluded that ECOWAS trade area should integrate agricultural priorities and be implemented through special free trade strategy, known as ECOWAP and ETLs respectively. As for the analysis of the competitiveness of the manufactured goods, Osabuohien (2007) showed positive and significant effect of free trade agreement on economic growth and development of ECOWAS members, taking Ghana and Nigeria as case-studies, while Esso (2010), after re-examining the relationship between the finance and the growth, pointed out to the long run relationship between financial development and economic growth.

Different studies have analysed the effects of regional trade agreements of the competitiveness of manufactured goods. The examples include Frank (1978) who identified learning by doing, the level of technology, intra-sectorial specialization, and competition as the driving factors of high efficient use of resources and improved quality of products in developing countries. There is also Krueger (1978) who explained two processes whereby the economic growth is influenced by the trade openness, namely through (1) dynamic advantages that include best use of available resources, capacity and efficient management of investment opportunities, and (2) indirect effects that concern more liberalized trade aiming at boosting exports and gross domestic product. Riviera-Batiz and Romer (1991) considered research and development as a source of economic growth and concluded that the access to know-how technology and high incentives for industrial production are enhanced by accelerated process of trade. Asheim and Isaksen (2002) advised firms to exploit both locally and externally available resources and world-class to enhance their competitiveness, coupled with appropriate innovation systems and technology transfer. In different Southeast Asia, Yoshimatsu (2002) proposed that countries

³ The Central America Free Trade Agreement (CAFTA) is created on May 28th 2004 by five countries namely Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua (Jansen, 2008).

⁴ For this region, NAFTA (North American Free Trade Agreement) is created on January 1st 1994, between Canada, Mexico and USA.

⁵ COMESA stands for the Common Market for Eastern and Southern Africa. It was formed in 1994 to replace the Preferential Trade Area created in 1981. The current members of COMESA are Egypt, Libya, Sudan, Tunisia, Djibuti, Eritrea, Ethiopia, Somalia, Comoros, Madagascar, Mauritius, Seychelles, Burundi, Kenya, Malawi, Rwanda, Uganda, Eswatini (Swaziland), Zambia, Zimbabwe, and Democratic Republic of Congo.

⁶ ECOWAS is the Economic Community of West African States, created on May 28th 1975. The current members are Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

need to gain the economies of scale to use efficiently available resources and achieve high value-added products. Given the smallness of ASEAN⁷ domestic market, individual firms decided to sell their manufactured goods in the region from firm to firm, from consumer to consumer.

3. Materials and Methods

This paper has used secondary data on imports and exports retrieved from FAOSTAT website, Rwanda Revenue Authority and National Bank of Rwanda to analyse the level of trade performance for soybean, bean, maize, potato, rice and wheat⁸ sectors from 2007 to 2017. The analysis of trade performance at the sector level can be carried out by assessing trade indices of competitiveness. Latruffe (2010) presents a list of indicators based on the neoclassical economics which focuses on trade success and which measures competitiveness with the real exchange rate, comparative advantage indices, and export or import indices.

We use the Net Export Index (Bantele & Carraresi, 2007) and the Grubel-Lloyd (GL) index (Grubel & Lloyd, 1975) for data analysis. These indices are preferred to traditional accounting methods because the latter do not account for the distribution and marketing expenditures (Frohbert & Hartmann, 1997).

The export market shares (EMS) are a simple measure of competitiveness. EMS can be measured in terms of quantity or in terms of value. The net export index (NEI) is the country's or sector's exports less its imports divided by the total value of trade (Banterle & Carraresi, 2007). In our analysis, we used the net export index (NEI) and the Grubel-Lloyd (GL) measure (Grubel & Lloyd, 1975) for each of the three sectors. The NEI is the difference between a sector's exports and imports divided by the total value of trade (Banterle and Carraresi, 2007).

$$(1) NEI_{ij} = \frac{X_{ij} - M_{ij}}{X_{ij} + M_{ij}},$$

where X are exports; M are imports; j denotes a sector or product; i denotes the country considered. The NEI index lies between -1 (when a country imports only) and 1 (when a country exports only), with a value of 0 in the case of equality of imports and exports.

The export-to-import price ratio allows the difference in quality between exported and imported products to be assessed. It is defined as the ratio of the unit value per ton exported divided by the unit per ton imported (Bojnec, 2003). A ratio greater than 1 would indicate that exports are more expensive, and thus of higher quality, than imports. The opposite is true for a ratio less than 1.

The measure of Intra-Industry Trade used in this research is referred to as Grubel-Lloyd (G-L) index (see Grubel & Lloyd, 1975; Fontagné & Freudenberg, 1997; Banterle & Carraresi, 2007; Latruffe, 2010).

The GL indicator assesses the health of exports by accounting for the fact that a product is often exported and imported at the same time (Latruffe, 2010). It measures intra and inter-industry trade for a given product. The formula of G-L index is as follows:

$$(2) GL_{ij} = 1 - \frac{|X_{ij} - M_{ij}|}{X_{ij} + M_{ij}},$$

where X are exports; M are imports; j denotes a sector or product, i denotes the country considered.

The GL index has a range between 0 and 1, with the value 0 indicating that all trade taking place inside the j-th product group is inter-industry (e.g. only exports, or only imports), while the value 1 indicates an intra-industry trade only (exports equal imports).

⁷ASEAN means Association of Southeast Asian Nations, created on August 6th 1967 as an intergovernmental cooperation to facilitate economic, political, security, military, educational, and sociocultural integration. The current members are Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, The Philippines, Singapore, Thailand, and Vietnam.

⁸ The selected products are mainly the CIP priority crops. They are also the non-traditional exporting crops in Rwanda.

4. Results and Discussion

The analysis of external trade performance for the Rwandan priority foodstuffs can be performed by evaluating the trade indices of competitiveness (Latruffe, 2010). According to Frohberg and Hartmann (1997), the use of these neoclassical economics-based indices has the advantages of taking into account the marketing costs for exporting or importing targeted agricultural products, and considering simultaneously the demand and supply responses.

The results reported in Table 1 show that the Net Export Index (NEI) is mostly negative for maize grain, maize flour, and potato revealing that the imports are greater than exports. The same results disclose the information that the country is a net importer of rice and soybean. For fresh beans, dried beans, the NEI results indicate that the country has registered an increase of exports in value comparatively to imports for most of the years under study. The same is observed for the wheat flour whose corresponding net export indices reveal quite a similar pattern for the second half of the period under study during which Rwanda registered an exponential increase of wheat flour exports. This could be attributed to the initiative of the Government of Rwanda to transform the wheat value chain which led to an increase of local production of wheat (Murindahabi, Qiang & Ekanayake, 2018), and the presence of new large-scale wheat processors in the exports sector, with effective commercial production from 2011 (especially for Bakhersa Grain Milling), that have positively impacted the wheat flour exports (Gathani & Stoelinga, 2012).

Table 1: External Trade Performance: Empirical Results for Priority Foodstuffs

Year	Net Export Index							Grubel-Lloyd Index								
	Fresh Beans	Dried Beans	Maize Grain	Maize Flour	Wheat Flour	Rice	Soy - bean	Pota - to	Fresh Beans	Dried Beans	Maize Grain	Maize Flour	Wheat Flour	Rice	Soy - bean	Po - tato
2007	-0.25	-0.18	-0.72	-0.99	-0.94	—	—	1.00	0.75	0.82	0.28	0.01	0.06	—	—	0.00
2008	0.97	0.91	-0.99	0.06	-0.83	-1.00	-0.96	-0.68	0.03	0.09	0.01	0.94	0.17	0.00	0.04	0.32
2009	-0.26	0.39	-1.00	-0.95	-1.00	-1.00	—	0.60	0.74	0.61	0.00	0.05	0.00	0.00	—	0.40
2010	-0.60	-0.02	-0.97	-0.84	-0.96	-0.99	—	-0.20	0.40	0.98	0.03	0.16	0.04	0.01	—	0.80
2011	0.04	-0.67	-0.94	-0.92	0.35	-1.00	-0.97	0.60	0.96	0.33	0.06	0.08	0.65	0.00	0.03	0.40
2012	0.99	0.79	0.22	-0.12	0.41	—	—	-0.09	0.00	0.21	0.78	0.88	0.59	—	—	0.91
2013	-0.04	0.50	-0.65	0.74	0.50	-1.00	-0.97	-0.35	0.96	0.50	0.35	0.26	0.50	0.00	0.03	0.65
2014	-0.36	0.33	-0.97	0.79	0.48	-1.00	-0.99	-0.59	0.64	0.67	0.03	0.21	0.52	0.00	0.01	0.41
2015	0.70	0.38	-0.82	0.74	0.52	-1.00	-0.94	-0.23	0.30	0.62	0.18	0.26	0.48	0.00	0.06	0.77
2016	0.03	0.44	-0.90	0.22	0.67	-1.00	-1.00	—	0.97	0.56	0.10	0.78	0.33	0.00	0.00	—
2017	0.93	0.68	-0.97	-0.07	0.76	-1.00	-0.98	—	0.07	0.32	0.03	0.93	0.24	0.00	0.02	—

Source: Own calculations based on data from National Bank of Rwanda and FAOSTAT

The Grubel-Lloyd (GL) Index values show a quite similar pattern for all these foodstuffs, and based on a threshold of a GL measure of 0.5 (Banterle & Carraresi, 2007), the results attest that, for fresh beans and dried beans, Rwanda is exhibiting a strong intra-industry trade for many years out of 11 considered for the study period. For other food products, the GL values are close to 0 attesting that the country has experienced a strong inter-industry trade which is pronounced more for rice, soybean and maize grain and less for maize flour and wheat flour.

Other authors and technical reports from government agencies and development partners working in the agricultural sector and international trade corroborate the empirical results of this study. For instance, regarding the increase of priority foodstuffs imports from neighbor countries, Musabanganji (2007) stresses that despite the increase of production of priority food products resulting from the implementation of sectoral transformation initiatives among which the Crop Intensification Programme (CIP), local maize grain production remains insufficient compared to domestic demand. This is also supported by the assertion by MINICOM (2014) and RDB (2014) that local maize processing companies are operating under their installed capacities, leading then to the increase of maize grain and maize flour imports. The same applies to rice and soybean for which Rwanda is qualified as a net importer. This comes to support the findings by Nkurunziza (2015) and Ghins & Pauw (2018) whose studies attest that, for rice, the country has increasingly become dependent on external markets to substantially satisfy the domestic demand. As for the soybean, a study commissioned by Rwanda Agriculture Board (RAB, 2016) revealed that there is need to increase the investment in soybean value chain as its current productivity is still low, and the import bill to feed local soybean processing companies with raw materials is high. This rise in imports is on one hand grounded in low productivity of many agricultural sub-sectors due to low technology adoption, and lack of efficient and demand-driven extension services. On the other hand, the other reason that would be behind such a fact would be the relatively high production costs for many agricultural products in the East African community region (see for instance, Tukamuhabwa, 2015; Musabanganji, 2017; Nkurunziza, 2018).

The study results also attest that, in addition to being an importer of the above mentioned foodstuffs, Rwanda is an exporter of wheat flour, fresh beans and dried beans. Rwanda exports foodstuffs not only to EAC member countries, but also to other African countries and beyond. As Musabanganji et al. (2016) point out, Rwanda is the main source of agro-food products formally or informally imported by the eastern region of the Democratic Republic of Congo inhabited by more than 2 million inhabitants (including 1.8 million for Bukavu and Goma). Some European and Middle East countries are importing fresh beans from Rwanda, and the Akagera region in Tanzania, Burundi and Uganda are also the importing regions of Rwanda's agricultural products and are the main markets for its agricultural production. These trade flows result from its access to global and regional markets made possible by prioritizing trade-related global and regional initiatives. Moreover, it should be noted that following its accession to global and regional communities, Rwanda can develop its export potential, especially for wheat flour, fresh beans and dried beans but success will depend more on the increased accompanying measures to develop a dynamic commercial network and improve agricultural value chains productivity.

5. Conclusion and Policy Implications

This paper has shown the contribution of the regional integration in the development of agriculture sector. The literature review showed that, where agreements are effective, regional integration is a powerful tool to enhance the development of agricultural value chains. The development of Rwandan exports industry has increased the quantity of exports to neighbor countries. Through the analysis of NEI and GL indices, the study showed that, for wheat flour, dried beans and fresh bean, the increase of value chains productivity can contribute significantly to the comparative advantage of the country on regional market whose access has been facilitated by its membership to regional communities (for instance, COMESA and EAC). The regional trade agreements are producing learning effects to their member countries as they make them accustomed with the transactions with the partners. From this experience, countries that perform best in trade transactions within an RTA may perform well in the continental free trade agreement. In this regards, it is recommended to work for removing or alleviating the bottlenecks that prevent farmers from producing enough for export. This means that measures should be taken to increase the crop productivity of crops in Rwanda and to enhance the liberalization of trade to sustain the flows of agricultural productions in the region and beyond.

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The effect of human capital development on economic growth in Rwanda

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Abstract

After 1994 genocide against Tutsi, the country had almost lost its total human capital resources and the remaining has scattered all over the planet. The government of Rwanda tried to restore the stability as well as the human development to revive its economy. This study examined the effect of human capital development on economic growth in Rwanda. The paper used the data collected from mostly public institutions for variables Gross Domestic Product, Public Expenditure on Education, Public Expenditures on Health, Primary School Enrolment, Secondary school Enrolment and Tertiary School Enrolment spanning from 2004 to 2018. The vector error correction model statistical technique was employed to analyze the data. The research results of the research work confirms the positive effect of human capital development of economic growth in Rwanda where public expenditure on health and education show a positive and significant contribution on GDP growth in Rwanda, tertiary education showed the positive effect on economic growth whereas primary and secondary showed the negative.

Key words: *Human Capital, economic growth, Vector Error Correction Model, Rwanda*

"The African Continental Free Trade Area: Challenges and Opportunities",

The intra-trade of African countries depends on sufficient and efficient use of their resources, it is with no doubt known that African continent is endowed with enough resources (Natural resources and human resources). The high population growth rate of the continent signals the increase of its potential in human resources. If the latter is developed and their innovational and technological progress are nurtured, will highly impact on the production of goods and services of countries within the continent which will be traded and exchanged between members. The linkage between the theme of the conference "The African Continental free Trade Area: challenges and Opportunities" and the research topic of "the effect of Human Capital Development on Economic Growth in Rwanda" is due to the ability of the continent (countries) to invest in their human capital which is the factor of production of these goods and services that are core center of the African continental free trade area and its management.

1. Introduction

Human capital is a stock of knowledge, habits, social and personality attributes, including creativity, embodied in the ability to perform labor so as to produce economic value. The Human Development summarizes assessment of long-term progress in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. It takes into account a country's expectancy at birth, adult literacy levels and educational attainment, as well as real GDP per capita income (GoR, 2015).

Immediately after the genocide of 1994 there was general disarray and bewilderment. However, the country's leadership provided tangible, firm direction and thrust, derived from a clear vision of the future (Obura, 2003). After 1994, the main concerns were for securing the nation, rebuilding the economy, growing enough food, building roads, providing housing, educating the children, providing health care and ensuring justice was done. As the economy recovered from a low base in the aftermath of the genocide and associated conflicts (1996-2000), real GDP grew at over 10% per year (GoR, 2007).

Various interventions and strategies were designed by the government of Rwanda to try to restore the stability to rebuild its human capital resources to revive its economy. The current human capital development is still a work in progress due to the changing labour market requirements and economic factor requirements. Rwanda grappled with severe human resource capacity gaps not only as a result of the genocide, but also low previous efforts made in developing the human resources.

The government set up the Vision 2020 as a long-term framework for Rwanda's development, presenting the key priorities and providing Rwandans with a guiding tool for the future (GoR, 2000). The aim of Vision 2020 is to address the challenges for the country from a people-centred perspective. According to the vision 2020 document, human resources will be improved, so that Rwanda can become a knowledge-based economy (GoR, 2000). Therefore, the long-term aspirations of the Vision will translate into medium-term programmes of the National Poverty Reduction Strategy Paper (PRSP) as well as the National Investment Strategy (GoR, 2000).

According to Population Census 2012, the average growth rate of population is around 2.6 and population density is the highest in Africa 416 persons per square kilometer. This steady growth in working age population which reflects on increasing labour force participation.

The Labour Force Survey (LFS) of 2017 revealed that more than a half of population (52.9%) were in Labour force, this implies the importance of human capital as core factor of production, hence the country's economic growth. Despite the later increase, there is increasing rate of underutilization and unemployment especially among the youths (21.7%). Based on the demographic characteristics, women represents more than a half of population outside of the labour force (62.8%) which signal the needs more efforts for inclusive participation in Rwanda economic growth.

Sustainable Development Goals (3 & 4) stress governments to ensure healthy lives and promote well-being for all at all ages for their population, ensure inclusive and equitable quality education and promote life-long learning opportunities for all. The government of Rwanda has adopted and adapted various policy and programs instrument to improve lives of Rwandans from all stages and background. Education policies and programs have gone under restructuring and reviews to fit with the need of the labour market and economic changes.

Given key structural bottlenecks, the Rwandan government has decided to switch from an economy based on subsistence-oriented agriculture to a modern service-oriented economy by focusing on investment in the quality of the nation's principal asset: its people. In 2000, one major microeconomic structural problem that contributed to the macroeconomic situation facing Rwanda was the low level of human resource development, especially in literacy and skills development (MINEDUC, 2003). Indeed, education is not just an instrument, but also an outcome of poverty reduction and economic development.

Primary and basic secondary education were a priority within the framework of the international education targets, but were only one of a set of priorities for the education sector in Rwanda. In light of its broader vision of transforming Rwanda into a knowledge-based economy, the Government of Rwanda (GoR) was looking well beyond these medium-term goals towards a further horizon (Hayman, 2007). For instance, while other developing countries were trying to achieve universal primary education by 2015 (MDGs), Rwanda targeted to achieve Universal Secondary education (12YBE). By 2015, there was an increasing consensus that the completion of primary school and the subsequent participation in secondary education or vocational training makes the difference between depending on subsistence agriculture and informal trade, or being able to become a socially, economically and geographically mobile member of the modern labour force (Lloyd & Blanc, 1996; Strode, Wylde, & Murangwa, 2007).

The PRS-1 recognized that education is connected to poverty in several ways. First, lack of education is a poverty characteristic itself, as there is evidence that completing primary education may increase incomes by about 40% and improve both agricultural productivity and small enterprise development, thus clearly reducing poverty. Second, primary education has beneficial effects on the health situation, as particularly girls' education has an impact on child mortality, morbidity and fertility rates (Bigsten and Yanagizawa, 2005).

The Rwandan government first took steps to facilitate the enrolment of children in primary schools. In October 2002, a remedial programme has been introduced for out-of-school and drop-out children (Kanamugire and Rutakamize, 2009). An important step was the fee free primary education (Bigsten and Yanagizawa, 2005). The above education policies and the food-for-schooling programmes are among the major interventions geared towards increasing the participation of disadvantaged groups in primary education. From 2001-2006 the economy was growing at an average rate of 6.4% per year yet inequality widened from 0.47% to 0.51% as measured by the Gini-coefficient in the same period (GoR, 2012). The EDPRS aims to consolidate and extend the strong achievements in human development (GoR, 2007).

After achieving almost universal primary enrolment due to different programmes implemented during the PRS-1, Rwanda faced the challenge to also achieve universal primary completion for all boys and girls, especially from poor families. Rwanda was at a crossroad in its human capital development process. Should the Government continue with extending its education policy or would it be better to rely on the more general poverty reduction policy geared at augmenting the so-called Social Protection (SP) of the population? The EDPRS-1 emphasis is on increasing the coverage and the quality of Nine Years Basic Education (9YBE), strengthening technical and Vocational Education and Training (TVET), and improving the quality of tertiary education (GoR, 2007). The extension of free education to secondary lower level in 2009 was one of the actions to reduce barriers to secondary education but also to reduce the primary school dropout and to increase the completion rates. The nine-year programme is intended to equip children with sufficient knowledge and skills to lead productive lives, thus addressing poverty reduction on an individual and societal basis (Hayman, 2007). Due to many factors like human capital development, Rwanda has close to two decades now achieved a remarkable economic growth and poverty reduction, with GDP growing at an average of 7.8% annually.

The government of Rwanda has employed enough efforts to improve health sector by introducing more policies, strategies and innovative solutions for the Rwandan people. The government of Rwanda has achieved tremendous in community health programme nationwide coverage where all villages (14,837) have three Community Health Workers (CHW), each with well-defined tasks, and an innovative e-Health system with mobile phones is used by all CHWs to connect them with Health Facilities. New interventions supported by mobile phone communication are undertaken in Adolescent Sexual and Reproductive Health and Rights and Gender Based Violence. Currently CHWs are testing all suspected malaria cases at community level before any treatment for fever is given to children under-five (10). (MoH, 2015).

In the area of disease prevention and health promotion, the government of Rwanda has managed to stabilize HIV prevalence, an almost 100% coverage of HIV testing during ANC visits and more than 90% of HIV+ pregnant women being on ART prophylaxis (under the Option B+ regimen) (9). The Malaria program has resulted in very high use of Long 5 Lasting Impregnated Nets.

The national TB Control programme reports high treatment success rates (86%) and very high success rates in the treatment of Multi Drug Resistant TB Cases (89%) (7). Collaboration between the AIDS/HIV and TB programme results in 97% of suspected TB cases tested for HIV (MoH, 2015)

Most villages have environmental and health promotion activities conducted by hygienic clubs. These clubs are responsible for promoting hand washing, introduction of improved latrines and other behavior change.

Rwanda has often faced epidemics including emerging and re-emerging infectious diseases such as Influenza A (H1N1), cholera, epidemic typhus and meningitis. Rwanda has been implementing an Integrated Disease Surveillance and Response (IDSR) system since 2000 and has developed guidelines and mechanisms to address health emergencies and epidemic preparedness in line with international health regulations although there are still challenges regarding timeliness and incompleteness of reporting. There is also a need to improve linkage of IDRS to the Health Management Information System (HMIS) and other e-Health systems.

Given these challenges and achievements in term of human capital development, this study has three main objectives: first, to uncover the effects of human capital development on economic growth, second, to show how investment in human capital is benefit in term of Economic and third, to identify the remaining barriers to furthering the economic growth rate which can help to achieve the targeted middle income by 2035 and high income by 2050.

1.1. Research Questions

Economic theory states human capital as factor of development, which is confirmed by various empirical studies. Country like Rwanda with limited natural resource endowment it mostly relies on human capital potentials. The research questions of this studies are:

- What is the importance of health sector and its contribution on economic growth in Rwanda?
- What is the importance of education sector and its contribution on economic growth in Rwanda?

1.2. Research Hypothesis

Solow's (1956) model stresses the importance human capital in the production function as contributor of economic growth. Various researchers conducted similar studies to this topic but in other countries and confirmed a positive impact of Human capital development on Economic growth (Okoro G. and Oyenubo S (2014), Khalafalla M. and Suliman A (2013), Miyanda h and venkatesh s (2017), Maria J, et al (2013) etc. The researchers believe that:

- There is a positive contribution of health Sector on economic growth in Rwanda;
- There is also a positive contribution of education sector on economic growth in Rwanda;

2. Literature review

2.1. Theoretical Review

Solow's (1956) model stress on the importance human capital in the production function as contributor of economic growth. It attempts to explain long-run economic growth by looking at capital accumulation, labor or population growth which increases in productivity. N. Gregory Mankiw, David Romer, and David Weil (year) created a human capital augmented version of the Solow–Swan model that can explain the failure of international investment to flow to poor countries. Long run growth rate of population growth of output per worker is an increasing function of the rate of population growth, indeed positive population growth is necessary for sustained economic growth of output per capita this means that population growth affects long run growth (Romer, 1996). A country's most talented people typically organize production by others, so they can spread their ability advantage over a larger scale with high intelligence and entrepreneurship but in most countries, rent seeking rewards talent more than entrepreneurship does, leading to stagnation (M. Murphy et al, 1990). Human development is closely linked to national wealth creation. While positive human development cannot

normally be associated with a shrinking economy, positive economic growth does not always translate into positive human development (GoR, 2015).

2.2. Empirical Review

Okero E. and Eyunubo S. (2014) studied the effect of human capital development on economic growth in Nigeria, by using ordinary least square and found a significant relationship between human capital and economic growth.

Osekhebhen E and Uchechi A. (April, 2014) studied augmented Solow human-capital-growth model to investigate the impact of human capital development on national output, a proxy for economic growth, using quarterly time- series data from 1999-2012. Empirical results show that human capital development exhibits significant positive impact on output level. This implies that human capital development is indispensable in the achievement of sustainable economic growth in Nigeria, as there is an increase in economic performance for every increase in human capital development.

Wakeel I. and Alani R. (2012) examined the contribution of different measures of human capital development to economic growth in Nigeria using growth account model and the empirical analysis showed that both education and health components of human capital development are crucial to economic growth in Nigeria.

Khalafalla M. and Suliman Z. (2013) studied impact of human capital on economic growth in Sudan for the period 1982-2009 by using a simultaneous equation model. The empirical results of the paper show that quality of the education has a determinant role in the economic growth; health quality factor has a positive impact on economic growth as expected and total factor productivity which mainly represents the state of technology has adverse effect on economic growth and human development.

Miyanda S. and Venkatesh H. (April 2017) examined the impact of human capital on economic growth in Zambia both in the short and long run by using Johansen's co-integration test and the Error Correction Model (ECM). The findings of the co-integration test indicates the presence of a long run relationship between economic growth and human capital. The estimated long run model reveals that human capital is the main contributor to real GDP per capita rise.

Maria Javed et al (2013) undertaken study to ascertain the relationship between human capital development and economic growth of Pakistan. Particularly, they were mostly interested to find out the impacts of expenditures on education and health on the growth performance of the country. Their study attempted to estimate the direction and magnitude of the coefficients for both short run and long run by using co-integration and error correction techniques on the time series data ranging from 1978 to 2008. The results of their study indicated that expenditures on health have positive and statistically significant effects on the economic growth rate in the short run. On the other hand, expenditures on education have significantly positive long run impacts.

The researchers have found that many works has been done in the country with similar economic stage but few work has been done on Rwandan case. With the country ambition to shift from agricultural based economy to knowledge based economy with no empirical based understanding on how human development impacts on country economy. Biswajit (2016) used Cobb Douglas function with investment in human capital at constant prices and employed labour force as independent variables where public investment on education and health combined were proxy for investment in human capital. This research paper has separated the public expenditure on education and on health as determinant of human capital development and wants for capture their effect differently.

Most of the paper used Cobb Douglas function and the Vector Auto-Regression (VAR) econometric model, the variables differ from paper to paper and the common findings are the positive relationship between human capital development and country economic growth. Some papers have omitted variables by either using much variables in the model or less variables. This paper tried to include the relevant variables in the model.

3. Methodology

This study employs econometric approach Vector Error Correction Model (VAR), co-integration and error correction model (VECM) estimation technique that provides directional relationship of the variables. This procedure helps to determine the impact of more than one variables on the dependent variable in short and long run by estimating the magnitude and coefficients of the model. Secondary data was used spanning from 2004 to 2018.

3.1. Data Description

The data used in this research covers a period of 15 years, 2004-2018. They are converted into semi-annual in order to have a big sample size, which become 30 observations for each variable. In addition, all data used are defined into calendar budget (January-December). It is important to note that since 2009, Rwanda had started implementing fiscal budget -beginning in July until June of another year- in order to comply with the fiscal budget of EAC member states.

3.1.1. Source of the data

The GDP nominal data come from NISR quarterly reports of Rwandan national account whereas education and health public expenditures data come from annual/quarterly reports of budget execution of MINECOFIN and then schooling enrollment variables come from MINEDUC annual reports. However, Public expenditures are defined as real expenditures consumed, during the annual/fiscal budget, in education and health sectors, (it includes functionalities expenses and project development expenses of MINEDUC and MoH and their public agencies).

3.1.2. Data limitation and challenges

There were the missing data on public expenditures on education and health before 2004; this led us to convert them into semi-annual in order to have long series of independents and dependent variables. By referring to the other empirical works/researches done on this same topic, it found that our model should have some employment indicators as independent variables, which show the real picture or output of impact of human capital development in labour market, in particular, and in the economic growth in general. Unfortunately, this study missed the long series information on these indicators because household surveys conducted last 20-30 years ago did not collect information on annual basis.

3.1.3. Assumptions

The methodology approach used for converting annual data to semi-annual data. The annual data from primary, secondary and tertiary school enrolment has been transformed into semester basis. It was assumed that the number of students recorded during the first semester is equal to the number of student of the second semester during the same school/academic year. For education and health public expenditures, it was assumed that the budget used in the first semester (January-June) is equal to the budget consumed in the second semester (July-December) for 2004 – 2008⁹. However, during 2009, the executed budget ~~run~~ from January to June 2009 has been added with half budget executed from July to December 2009 for the fiscal budget 2009/2010. For 2010, the executed budget for third and fourth quarters of 2009/ 2010 has been added with first and second quarters of 2011/2012.The same previous methodology was applied from 2011 until 2018.

3.2. Research Variables

Table1: Research Variables

Variable	Abbreviation	Definition	Measurement
Gross Domestic Product (Nominal)	GDP-n	It is GDP calculated at current market prices.	GDP was used in nominal value

⁹ It is important to note that before 2008, Rwanda used calendar year budget started from January to December each year.

Public Expenditure on Health	PEH	Consists of recurrent and capital spending incurred by the government in health sector in a year	Public expenditure on health was used as execution in absolute value
Public Expenditure on Education	PEE	Consists of recurrent and capital spending incurred by the government on education sector in a year	Public expenditure on education also was used as execution in absolute value
Primary School Enrolment	PSE	The total number of students registered and attending classes in primary school in a year.	Number of student enrolled per year in absolute value
Secondary School Enrolment	SSE	The total number of students registered and attending classes in secondary school in a year.	Number of student enrolled per year in absolute value
Tertiary School Enrolment	TSE	The total number of students registered and attending classes in tertiary school in a year.	Number of student enrolled per year in absolute value

3.3. Description of the Model

The research used the GDP as indicator of the economic growth of the country and as the dependent variable, Public expenditure on education and health were used as independent variables as well as the primary, secondary and tertiary school enrolments.

3.3.1. Theoretical Model

The model or curve fit of a linear relationship between each independent variable and the dependent variable in this paper can then be well theoretically presented as:

$$GDP=f(PEE, PEH, PSE, SSE, TSE) \dots\dots\dots (1)$$

Where GDP stands for Gross Domestic Product nominal, PEE stands for Public Expenditures on Education, PEH stands for Public Expenditures on Health, PSE stands for Primary School Enrolment, SSE stands for Secondary School Enrolment and TSE for Tertiary School Enrolments

3.3.2. Empirical Model

The empirical model specification takes the following form:

$$\text{Log(GDP-n)} = C_{(1)} + C_{(2)}\text{Log(PEE)} + C_{(3)}\text{Log(PEH)} + C_{(4)}\text{Log(PRIED)} + C_{(5)}\text{Log(SEC_ED)} + C_{(6)}\text{Log(TER_ED)} + \mu \dots\dots\dots(2)$$

3.4. Data analysis and Interpretation

The research was gone under various test to ensure the quality of outcome such as Test for Unit Root where Augmented Dickey-Fuller (ADF) was used to test for stationarity of variables used in the model. Testing for Co-integration, in this paper Johansen multivariate co-integration test was used to check the long-run relationship of variables.Vector Error Correction Model also was used to investigate the presence of equilibrium or disequilibrium between the short run dynamics of variables and long run equilibrium. Testing for Causality, the study performed a causality test using granger causality test to see the causal relationship between variables.

3.4.1. Unit Root test

Most macroeconomic series have unit root. The Augmented Dickey Fuller (ADF) of unit root test was used because it is the easiest and most commonly used in many econometrics time series data to test for stationary and it encounters the problem of autocorrelation used to be found in Dickey Fuller (DF) test. If in absolute value Test Statistics is greater than Critical Value in absolute term and The P-values of

variables are greater than 5% significance level then the study can reject null hypothesis and accept the Alternative which states there is a not root.

Since the variables are not stationary at level, the difference was employed to make the variable stationary as shown from the following question:

$$\text{Log}\Delta(\text{GDP-n}) = C_{(1)} + C_{(2)}\cdot\text{Log}\Delta(\text{PEE}) + C_{(3)}\cdot\text{Log}\Delta(\text{PEH}) + C_{(4)}\cdot\text{Log}\Delta(\text{PRIED}) + C_{(5)}\cdot\text{Log}\Delta(\text{SEC_ED}) + C_{(6)}\cdot\text{Log}\Delta(\text{TER_ED}) + \mu \dots\dots\dots(3)$$

Table2: Unit Root Test

V a r i - ables	ADF Unit Root Test at Level			ADF Unit Root Test after Difference		
	T-Statistics	Critical Val- ue	Probability	T-Statistics	Critical Value	Probability
GDP-n	3.289695	-3.699871*** -2.976263** -2.627420*	1.0000	-4.739761	-3.711457*** -2.981038** -2.629906*	0.0008
PEH	-0.006393	-3.699871*** -2.976263** -2.627420*	0.9500	-5.955472	-3.711457*** -2.981038** -2.629906*	0.0000
PEE	-0.918292	-3.699871*** -2.976263** -2.627420*	0.7666	-6.085815	-3.711457*** -2.981038** -2.629906*	0.0000
PSE	-2.152514	-3.699871*** -2.976263** -2.627420*	0.2271	-6.739561	-3.711457*** -2.981038** -2.629906*	0.0000
SSE	-0.831821	-3.752946*** -2.998064** -2.638752*	0.7908	-24.37205	-3.724070*** -2.986225** -2.632604*	0.0001
TSE	-1.665764	-3.752946*** -2.998064** -2.638752*	0.4345	-8.424529	-4.356068*** -3.595026** -3.233456*	0.0000

Note: ADF is the augmented Dickey Fuller test. The null hypothesis is that the series have unit root (non-stationary). The asterisks (***) Significant at 99% confidence level, (**) Significant at 95% confidence level and (*) Significant at 90% confidence level.

GDP, PEH, PEE, PSE, TSE variables are stationary at the first difference then SSE variable is stationary at the second difference. In this regard, the results show that their p-values are less than significance level of 0.05 (5%) and the ADF Test statistics are greater in absolute value than the critical values test at significance level of 5%.

3.4.2. Test for co-integration

Co-integration test was done by using Johannsen multivariate and its procedure step starts by determining (selection) the order of vector auto regressive. The Akaike Information criterion (AIC) was used to determine the length of lag.

$$\Delta Y_t = (\alpha - I) Y_{t-1} + \mu \dots\dots\dots (4)$$

Where $\alpha = k \times k$ matrix, $I = k \times 1$ Matrix and Y stands for all variables in the model. Therefore the equation becomes:

$$\Delta Y = \beta Y_t + \mu_t \dots\dots\dots (5)$$

Where $\beta = (\alpha - I)$ the co-integration test determines rank (r) of matrix (β) and results are represented in the following table:

Table3: Test for Co-integration

Null	Alternative	Trace statistic	Critical value(0.05)
r=0	r=1	163.4761	103.8473
r=1	r=2	75.10968	76.97277
r=2	r=3	45.56178	54.07904
r=3	r=4	27.72003	35.19275
r=4	r=5	12.28069	20.26184
r=5	r=6	4.983188	9.164546
r=5	r=6	163.4761	103.8473
Max Eigen statistic			
r=0	r=1	88.36644	40.95680
r=1	r=2	29.54789	34.80587
r=2	r=3	17.84175	28.58808
r=3	r=4	15.43934	22.29962
r=4	r=5	7.297503	15.89210
r=5	r=6	4.983188	9.164546
r=5	r=6	88.36644	40.95680

3.4.3. Error Correction Model

Error correction model indicates the speed of adjustment from short run relationship towards the long run equilibrium after a short run shock. Co-integrated variables normally must have an ECM representation and another advantage of the ECM representation is that it avoids the spurious regression problem between the variables. After having the long run relationship of variables, there must be short run relationship

$$\Delta Y = \phi_0 + \sum \lambda \Delta Y_{t-1} + 1 - \phi \epsilon_{t-1} + Vt :6$$

Where Δ denotes first difference, Y stands for all variables φ stands for a constants, is Error Correction Term (ECT) and is φ coefficient of error correction term which theoretically must be negative and εt-1 is residuals from co-integration vector.

Table 4: Error correction Test

Dependent variable: DLOG(GDP_N)		
Variable	coefficient	t-prob
Constance	5.786719	0.0001
DLOG(P_EX_ED(-4))	1.840812	0.0886
DLOG(P_EX_H(-6)	2.123762	0.0535
DLOG(PRI_ED	-1.676510	0.1175
DDLOG(SEC_ED	-1.104923	0.2892
DLOG(TER_ED(-5))	5.415163	0.0001
LOG(GDP_N(-1))	-5.747751	0.0001
@TREND	5.373936	0.0001
R-squared	0.890170	
F-statistic	15.05204	
Prob(F-statistic)	0.000026	
Durbin-Watson stat	2.043999	

Table 4 shows the results of estimated coefficients for long run. The coefficient of public expenditure on health is in line with anticipation inferring a positive relationship between government expenditure on health and economic growth in long run. These results indicate that 1% increase in health expenditures increases GDP growth by 2.123 percent in the long run. The values of the coefficient indicates that the magnitude of the effect on GDP is not big in the case of Rwanda. Also public expenditure on education has found to have positive relationship with economic growth in Rwanda, the coefficient is in line with expectation which implies that 1% increase in the public expenditure on education increases GDP growth by 1.840 percent in long run. This could be because of the fact the health sector remains neglected in this country over several years. The coefficient for primary and secondary school enrolment are negative which means that primary and secondary has opposite relation with economic growth in Rwanda, this could be because of the fact that primary and secondary students are considered as none productive and are out of the labor force. The results also showed the positive relationship between tertiary education and economic growth where the coefficient is 5.415. This maybe because most of tertiary education student are at working age and some of them are employed or self-employed.

3.4.4. Test for Causality

This research paper conducted the causality test to check the causal relationship of variables because most macroeconomic series have causality. The causality test was performed by using granger causality test where on variable granger cause another. The system of equations was used to determine the direction of causality between GDP, Public expenditure on health, public expenditure on education, primary, secondary and tertiary school enrolment. The results of the analysis confirmed bi-directional relationship as well as uni-directional relationship. It was found that there is bi-directional causality between GDP and independent variables except public expenditure on education where GDP granger cause public expenditure on education but not verse versa.

4. Conclusion and policy implications

After 1994 genocide, the Government of Rwanda has done tremendous work of rebuilding country's human capital. New educational and health policies and strategies were designed and implemented and the country's achievement hit the global indicators. The main objective of this research paper was to assess the effect of human capital development on economic growth in Rwanda, the findings of the research work accepted the research hypothesis and they confirmed the positive effect of human capital development of economic growth in Rwanda where public expenditure on health and education show a positive and significant contribution on GDP growth in Rwanda. Tertiary education has shown the positive relationship to country's economic growth whereas the primary and secondary education has shown negative relationship to economic growth.

From the old economic theories to the current empirical works, it has been proven that human capital development which sharpen the country's potential labour force is an induced factor of production and contributes to country's economic growth. The government of Rwanda should increase the pace of public expenditure on education and health but also to improve both the quality and the quantity of health service and education in Rwanda. Given the results of the research study, the government of Rwanda to achieve the knowledge based economy there is a need to budgetary allocate sufficient resources on education and health sectors as they positively affect country's economic growth.

It is paramount to review and adjust the education and training system of Rwanda to match them with labour market demand. The Technical and vocation trainings should be more encouraged by providing the sufficient and modern equipment and materials to respond to the modernized and growing technological global society. The government of Rwanda should encourage the creative, innovation and incubation centers for the young generation of various education backgrounds and enhance the culture of achievement and excellence. Educational institutions at all levels should provide demand driven employability skills for decent job creation and private sector satisfaction. It is also important that the government to ensure the provision of quality of technical and vocational education and training (TVET) to be responsive to current and future needs of labour market through emphasis of practical skills rather than theory.

The development of human and non-human inputs is not only increasing the number of graduates in the Country. Quality of education is the key component of human capital development. In this context, Government of Rwanda should improve its educational system to produce desired output in the future, which will be competitive at regional level and national level. The following recommendations will be considered.

- Having appropriate teaching methods and the quality of teaching aids.
- Increasing infrastructural facilities and equipment's
- Developing and implementing a well-designed curriculum
- Increasing the availability of suitable textbooks, well equipped library and resource centers for teachers and students
- Reducing students-teacher ratios and students-classroom ratios
- Enforcing the planning administration and efficiency for inspection and supervision
- Increase the use of ICT in teaching and learning by upgrading the skills of teachers and by upgrading preservice or in-service teacher training and increasing staff productivity
- Strengthening research, innovations and development

The government of Rwanda should provide sufficient facilities and community health workers with sufficient skills to handle Rwandan societal health issues (Malnutrition, poor hygiene, etc) and improve the health infrastructure and train specialized health personnel. The government should ensure that the access to quality of essential health services and put place the policies, programs and strategies that are preventive to health diseases, service deliveries management and satisfaction should be improved and enforced.

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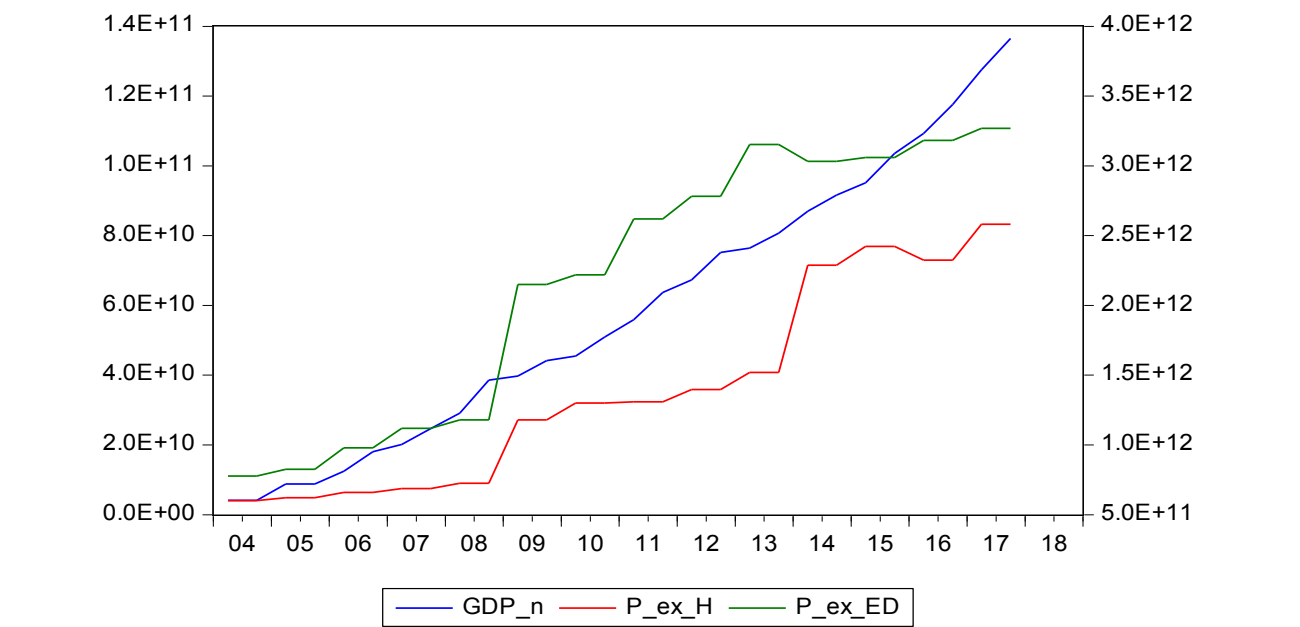
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Annexes

Test for causality

Pairwise Granger Causality Tests			
Date: 03/05/19 Time: 12:59			
Sample: 2004S1 2017S2			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
P_EX_ED does not Granger Cause GDP_N	26	1.79214	0.1912
GDP_N does not Granger Cause P_EX_ED		5.07711	0.0159
P_EX_H does not Granger Cause GDP_N	26	0.14262	0.8679
GDP_N does not Granger Cause P_EX_H		3.29074	0.0571
PRI_ED does not Granger Cause GDP_N	26	0.40598	0.6714
GDP_N does not Granger Cause PRI_ED		0.79583	0.4644
TER_ED does not Granger Cause GDP_N	26	3.30766	0.0564
GDP_N does not Granger Cause TER_ED		1.37573	0.2745
SEC_ED does not Granger Cause GDP_N	26	2.14613	0.1419
GDP_N does not Granger Cause SEC_ED		2.45755	0.1099
P_EX_H does not Granger Cause P_EX_ED	26	0.24352	0.7860
P_EX_ED does not Granger Cause P_EX_H		2.58754	0.0990
PRI_ED does not Granger Cause P_EX_ED	26	2.48221	0.1077
P_EX_ED does not Granger Cause PRI_ED		0.05476	0.9468
TER_ED does not Granger Cause P_EX_ED	26	2.30819	0.1241
P_EX_ED does not Granger Cause TER_ED		0.36174	0.7007
SEC_ED does not Granger Cause P_EX_ED	26	0.97266	0.3945
P_EX_ED does not Granger Cause SEC_ED		2.79885	0.0836
PRI_ED does not Granger Cause P_EX_H	26	3.75349	0.0404

P_EX_H does not Granger Cause PRI_ED		2.22477	0.1329
TER_ED does not Granger Cause P_EX_H	26	5.31072	0.0136
P_EX_H does not Granger Cause TER_ED		1.59677	0.2262
SEC_ED does not Granger Cause P_EX_H	26	3.39527	0.0528
P_EX_H does not Granger Cause SEC_ED		0.92309	0.4128
TER_ED does not Granger Cause PRI_ED	26	0.54435	0.5882
PRI_ED does not Granger Cause TER_ED		4.21650	0.0289
SEC_ED does not Granger Cause PRI_ED	26	0.57105	0.5735
PRI_ED does not Granger Cause SEC_ED		3.97483	0.0344
SEC_ED does not Granger Cause TER_ED	26	0.42568	0.6588
TER_ED does not Granger Cause SEC_ED		1.03906	0.3713



Dependent Variable: LOG(GDP_N)

Method: Least Squares

Date: 03/05/19 Time: 08:22

Sample (adjusted): 2004S1 2017S2

Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-20.01211	7.936897	-2.521402	0.0194
LOG(P_EX_ED)	-0.565536	0.115153	-4.911181	0.0001
LOG(P_EX_H)	0.378773	0.064136	5.905777	0.0000
LOG(PRI_ED)	2.992255	0.653514	4.578717	0.0001
LOG(SEC_ED)	0.540626	0.260765	2.073235	0.0501
LOG(TER_ED)	0.214569	0.334044	0.642338	0.5273
R-squared	0.987783	Mean dependent var	28.16025	
Adjusted R-squared	0.985007	S.D. dependent var	0.574489	
S.E. of regression	0.070344	Akaike info criterion	-2.283428	
Sum squared resid	0.108862	Schwarz criterion	-1.997956	
Log likelihood	37.96799	Hannan-Quinn criter.	-2.196156	
F-statistic	355.7660	Durbin-Watson stat	2.204261	
Prob(F-statistic)	0.000000			

The Effect of Human Capital on Performance of Small and Medium Manufacturing Companies in Rwanda: A Mediating Role of Innovation Capability

By: Kasema Romain

Abstract

The current business environment has drastically and rapidly changed due to technology advancement, working environments and the emphasis on cost effectiveness. This situation requires firms to strive for superior competitive advantages via creativity and innovativeness, and undoubtedly human capital plays an important role. This paper investigated the human capital-performance nexus with a mediating role of innovation among small and medium manufacturing companies in Rwanda. More specifically, the study sought to determine the effect of human capital on firm performance, to determine the effect of human capital on innovation and to establish the mediating role of innovation in the relationship between human capital and firm performance. The study was basically a descripto-exploratory and correlational one involving a sample size of 106 small and medium manufactures purposely selected countrywide. Data were collected using a survey questionnaire and analyzed using Statistical Package for Social Science and SATA package. The study found that human capital has an effect on firm performance and human capital significantly influences innovation while innovation mediated the relationship between human capital and firm performance. In respect to these findings, this study offered a combination of academic contributions for scholars and researchers and managerial implications, for policy makers and practitioners. To rebrand the Technical and vocational Education and Training program and improve the quality by closer monitoring and evaluation were among the recommendations. It was further recommended that though National Industrial Research and Development Agency, to provide financial incentives (subsidies) to firm that embark on innovation (Research and development).

Keywords: Human capital, firm performance, Entrepreneurship, Rwanda

1. Introduction

The main goal of the African Continental Free Trade Area (AfCFTA) being to create a single continental market for goods and services, with free movement of business persons and investments (African Union, 2018), there are however a set of challenges including human capital development that must be addressed first to ensure the AfCFTA's success. The manufacturing sector is significant to the economy in many respects; they are contributing to Gross Domestic Product (GDP) and employment and require a particular attention when it comes to competitiveness at country level. The AfCFTA will provide an era in which small and medium enterprises (SMEs) will have windows of doing more business within Africa as they serve as pillars for growing productive capacities and offer subcontracting services and linkages between enterprises. This enlarged market brings other opportunities and challenges to the SMEs as business will have the chance of spreading to other countries, they will have to content with the huge financial and human capacities requirements to operate cross-border. Currently, manufactured goods make up 42 percent of intra-African trade (Muchanga, 2018) but within the vast new trade area, "large-scale production of manufactured goods is going to increase and a huge drive towards industrialization." In fact, a strong manufacturing sector needs capable, healthy and skilled workers to produce a wide range of diversity of goods, including complex products that few other countries can make and to respond to market demand (Brendan, 2018). A recent survey from the global manufacturing competitiveness index confirmed that human capital is the most crucial drivers of growth and investment in manufacturing (Deloitte, 2016).

From the human capital theory to the resource based view of the firm, human capital has been theoretically and empirically linked to firm performance and competitiveness. However, the current business environment has drastically and rapidly changed due to technology advancement, working environments and the emphasis on cost effectiveness (Samad, 2011). This situation requires firms to strive for superior competitive advantages via creativity and innovativeness, and undoubtedly human capital plays an important role towards this. To develop a competitive advantage in this innovation-oriented competition it is important that firms focus on the workforce as a competitive weapon. To be effective in such a business environment, firm will need to invest enough resources to ensure that employees have knowledge, skills, education and competencies (Marimuthu et al., 2009); brief employees who are proactive, positive and who have adequate quality of human capital (Samad, 2012) needed. In response to the changes, most firms that have encompassed the notion of human capital have a good competitive advantage that enhances higher performance. As such a number of research has been conducted linking human capital to firm performance Marimuthu et al., 2009; Katou, 2009; Ahesha and Sujani (2012); Tessema (2015); Samad (2012); Chawla et al., 2010; etc.

Notwithstanding its leading role in signing and driving the AfCFTA negotiations and commensurate gains expected therein, the performance of manufacturing sector in Rwanda remains low and still questionable given their little contribution to GDP that remained stagnant. According to the World bank (2017) the manufacturing value added (MVA) remained stagnant at around 6%, while the total employment averaged 7% and exports at 10.2% a decade ago for instance when compared to South Africa (11.88%), Egypt (16.44%), Kenya (7.90%) and SSA (10.10%). This is a particularly stressful situation and there is, nevertheless, some lingering doubt whether Rwanda can compete internally and externally in the AfCFTA. Therefore, countries with large manufacturing bases and highly skilled labor force are most likely to benefit more from the agreement. The Rwandan manufacturing sector being characterized by low productivity and labor intensive activities; the question of human capital is very crucial. However, for manufacturing sectors to develop in Rwanda and compete internally and externally human capital must be developed beyond the current scope of skills available. This will contribute to a diversified industrial sector and growth in manufacturing value added. It is then important to examine if really human capital affects firm performance in Rwandan context and propose ways forwards to enhance and sustain human capital in Rwandan manufacturing sector in order to position the country's level of competitiveness to the intended large market.

Even though previous literature has identified human capital as the predictor of firm performance, however, to the research best knowledge components of human capital that are required for manufacturing companies in Rwanda have not been highlighted. Yet, strategic management literature has identified several factors contributing to performance; this paper looks at one of the factors i.e. human capital.

Therefore, this paper highlighted the link of human capital in terms of training, education, skills, knowledge and competence to performance of small and medium manufacturing companies in Rwanda. Additionally, firm performance is viewed as aspects of productivity and since human capital can be seen as an input and innovation as value addition, this study explores the human capital - performance nexus and the mediating role of innovation among a sample of small and medium scale manufacturing companies in Rwanda.

Consequently, grounded on the Human Capital Theory and Resource-Based View, this study aims to achieve the following three objectives:

1. To determine the effect of human capital on firm performance;
2. To establish the influence of human capital on innovation;
3. To determine the mediating role of innovation in the human capital-performance nexus.

The study intends to answer the three following research questions:

1. Can human capital affect firm performance?
2. Can human capital influence innovation?
3. Can innovation mediate the human capital- performance nexus?

After this background, the paper is structured as follows: section 2 presents the reviewed literature from which the human capital theory (HCT) and the resource-based view (RBV) that were identified as foundation of this study are discussed. The developed conceptual model and the empirical studies connecting human capital to firm performance with mediating effect of innovation are also elucidated. The forth section describes the methodological aspects of the study followed finally by the empirical findings and Conclusion.

2. Literature review

2.1. Definition of Human Capital and Firm Performance

- The Concept of Human Capital

The concept of human capital has been defined by several scholars as a key element in improving a firm assets and employees in order to increase productivity as well as sustain competitive advantage. Therefore, to sustain competitiveness in the organization human capital becomes an instrument used to increase productivity. According to Coleman (1988) human capital pertains to individuals "knowledge and abilities that allow for changes in action and economic growth." Unger et al (2001) conceptualized human capital as skills and knowledge that individuals acquire through investment in schooling, on-the job-training and other types of experience. Rastogi (2000) opined that human capital is an important input for organization especially for employees' continuous improvement mainly on knowledge, skills and abilities. The definition of human capital according to Organization for economic co-operation and development (OECD) (2001) is referred to as the knowledge, skills, and competencies, social and economic well-being. From the RBV and HCT perspective of firm human capital is defined as the training, knowledge and skills of its professionals that can be used to produce professional goods and services (Samran et al., 2012). Vidotto et al., 2017 supported this widely used definition by stating that human capital is a set of knowledge, skills and abilities that reside in the individual and that are used by him/her.

The underlying concepts in these definitions however, include the notions that human capital emphasizes on the skills and knowledge of employees rather than on the physical assets of a company (Muhammad, 2009; Barron, 2011; etc.). It comprises of knowledge, skills, and abilities to develop innovativeness possessed by the employees of an organization. Different perspectives of human capital have been debated for a past few decades (Samad, 2012). From the perspective of classic economic theory, human capital considers labor as a commodity that can be traded in terms of

purchase and sale (Marimuthu et al., 2009). This classical theory focusses on the exploitation of labor by capital. However, unlike labor, human capital refers to the knowledge, expertise, and skill one accumulates through education and training (Marimuthu et al., 2009). Therefore, five specific human capital drives were identified in the human capital literature which can have a substantial effect on firm performance: training, skill, education, knowledge and competencies (see for instance Marimuthu et al., 2009).

- The Concept of Innovation

Innovation capability is the firm potential in generating new and unique values by developing new idea procured (Bullinger et al., 2007). Kusiak (2009) defined innovation as a process with the aims of creating new products, knowledge, processes or services by the use of new or even existing knowledge. Innovation can be therefore viewed as an organizational capability since it is the act of deploying resources with a new ability to create value (Yang et al., 2006). Previous studies have shown that innovation plays an important role in determining the growth and competitiveness of any organization (Kim and Maubourgne, 2005). It has become therefore a pre-requisite and associated to growth, performance, competitiveness, increase in profits as well as long term survival of organizations (Pletcher and Mann, 2013; Bowen and Steel, 2010).

- Firm Performance

Being one of the most relevant constructs commonly used as final dependent variable (Richard et al., 2009), firm performance is the degree to which firms maintain business viability (Berns et al., 2009). This study treats firm performance as a multi-dimensional rather than a single construct; therefore, conceptualized as referred to increased sales, increased profit, increased market share, increased customer satisfaction and good quality product. Previous studies and the Human Capital Theory provided support on the link between human capital and firm performance.

2.2. Theoretical Review

- The Human Capital Theory (HCT)

The origin of human capital theory is rooted to the emergence of classical economics in 1776 and thereafter developed into a scientific theory (Chijindu et al., 2016). The idea of investing into human capital was first developed by Adam (1963) cited in (Chijindu et al., 2016) who argued in the *Wealth of Nations* that differences between the ways of working of individuals with different levels of education and training reflected differences in the returns necessary to defray the cost of acquiring those skills. Subsequently, Elliot (1991) developed the theory of human capital which concerns human capital in terms of quality, not quantity of the labor supply. Straightly after the manifestation of that concept as a theory, Schultz (1961) recognized human capital as one of the important factors of national economic growth in the modern economy (Dae-bong, 2009).

The theory suggests that a person's formal education determine his or her earning power. The human capital theory (HCT) holds that it is the key competences, skill, knowledge and abilities of the workforce that contributes to organizations competitive advantage. The theory contends that individuals with more or higher human capital achieve higher performance when executing tasks (Becker 1964) cited in Tessema, 2015. It then focuses attention on resourcing, human resource development, and reward strategies and practices. According to the HCT, education is an investment because it is believed that it could potentially confer private and social benefits. Theorists believe that education and earning power are correlated, which means, theoretically, that the more education one has, the more one can earn, and that the skills, knowledge and abilities that education provides can be transferred into the work in terms of productivity (Dae-bong, 2009).

- The Resource –based theory (RBT)

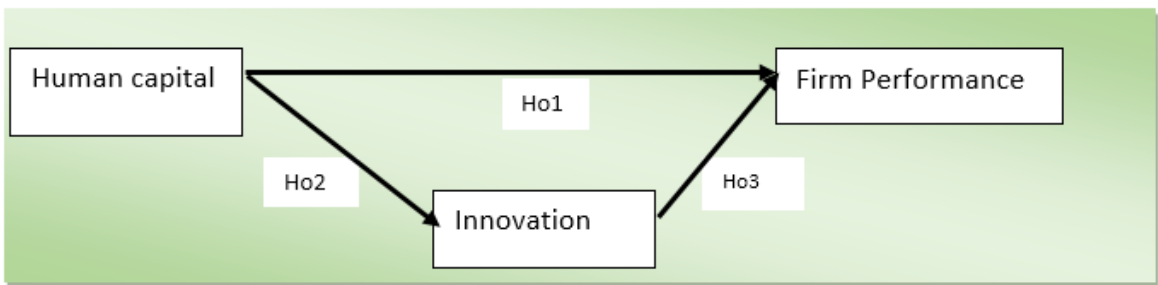
The introduction of RBT (Barney, 1986; Lippman and Rumelt, 1982) offered a theoretical explanation for why superior human capital might lead to firm performance. The RBT suggests that firm can

secure a sustained competitive advantage and hence superior performance through facilitating the development of competences that are firm specific, produce complex social relationship; are embedded in a firm's history and culture, and generate tacit organizational knowledge (Odhing, et al., 2013). It also contends that organizations are fundamentally idiosyncratic and over time accumulate unique combinations of resources and skills which allow them to garner rents on the basis of distinctive competence (Barney, 1991) cited in Samad, (2013). Swamson and Holton (2001) as cited in Samad (2013) revealed that human capital is one of the important resources that contribute towards business performance. It has been highly emphasized that internal resources that include human capital are crucial to sustained effectiveness and business performance (Wright et al., 1994). Brief, this theory recognizes human capital as the most valuable, non-substitutable and imperfectly imitable resource that a firm can successfully utilize to achieve productivity and competitiveness.

As consequence, the RBV is linked to human capital theory in that they all emphasize that investment in people adds to their value to the firm (Baron and Amstrong, 2007) and that available quality human capital contributes to the competitive advantage and increase firm performance.

2.3. Conceptual Model and Hypothesis

The conceptual model was developed to include human capital indicators/components deducted from the human capital theory. As seen in the HCT and other related literature, the general human capital includes training, skills, education, knowledge and competence that will enhance human capital effectiveness. However, all these indicators align with creating and developing new ideas (innovation), otherwise human capital remains sterile. Based on the literature reviews, it is therefore postulated that other factors kept constant, superior firm performance depends upon human capital with a mediating role of innovation.



Source: Researcher's compilation, 2019

From this conceptual model, three hypotheses were developed:

- H01: Human capital does not affect firm performance of small and medium manufacturing companies.
- H02: Human capital does not influence Innovation of small and medium manufacturing companies.
- H03: Innovation capability does not influence performance of small and medium manufacturing companies.

2.4. Empirical Studies

A number of studies have been conducted in strategic management on the link between human capital and business performance; but less is known about Rwanda manufacturing sector. Let some being given.

Ahesha and Sujani (2012) conducted a study in Sri Lanka with a sample of 40 companies listed under Colombo Stock Exchange. Using descriptive statistics and correlation analysis, the study found that there is a significant relationship between investment in human capital and firm financial performances. Using regression model in a survey research design on a sample of 143 small scale software sector in Addis Ababa Ethiopia, a study by Tessema (2015) indicated that having human capital investment in company lead to the improved company performance.

A study by van Uden, Knoben and Vermeulen (2014) examined whether human capital endowments and additional practices of firms such as formal training and employee slack time, have a positive relationship with the innovation output of firms. They tested this relationship in Kenya, Uganda and Tanzania with data stemming from the enterprise survey of the world bank findings revealed that there is a positive relation between human capital and innovation. In the same vein Schneider et al. (2010) argue that a firm level approach is needed to better understand the relations between capital and innovation. Their empirical results indeed showed that better trained employees will provide firms with more innovative output. Similarly, in the context of developing countries, Mahemba and Bruijin (2003) showed the importance of training for the innovative performance of firms, while Robson et al. (2009) do not find a positive relation between training and innovation in Ghana.

Ukenna et al., (2010) studied the effect of human capital on firm performance of 25 small scale business owners purposely selected in Awka metropolis of Nigeria. Using regression and correlation analyses while keeping constant other factors that can impact on organizational performance, the findings revealed that training and skill are stronger predictors of human capital effectiveness over and above knowledge and education. Another study by Seleim et al., (2007) analyzed the relationship between human capital and organizational performance of software companies. They found that the human capital indicators had a positive association on organizational performances.

A causal model that employed a set of cross-sectional data developed by Selvarajan et al., (2007) indicated that human capital enhancement paves a way for greater innovativeness and this in turn offers positive implications on firm performance. Samad (2013) assessed the contribution of human capital on business performance in Malaysia with three objectives: to examine the relationship human capital and business performance, (ii) to determine the contribution of human capital on business performance and (iii) to examine the most important aspect of human capital that influenced business performance. Data in this study was collected from a sample of 390 managerial staff in Malaysia logistics companies based on stratified random sampling. The obtained data were analyzed using correlation and regression methods in SPSS version 20. The study revealed that all aspects of human capital contributed significantly to business performance. However, Chawla et al., 2010 found that human capital does not always have a positive effect on venture performance.

Perera and Thrikawala (2012) conducted a study in Sri Lanka with the objective of investigating the impact of investment in human capital on financial performances of the companies in Sri Lanka. In order to achieve the objective of the study, financial information from financial statements of listed companies under Colombo Stock Exchange for the period of 2 years from 2009 to 2010 was used. Sample of the study was selected as 40 companies listed under Colombo Stock Exchange. Data analysis was carried out with the aid of SPSS using correlation and regression methods. Findings revealed that there is a significant relationship between investment in human capital and firm financial performance.

Sarwar et al., (2016) investigated the importance of human capital and human resources management practices on organizational performance with the mediating role of innovation in construction industry of Pakistan. Data were collected from a sample of 315 employees randomly selected from construction companies through a structured questionnaire. Data were analyzed using structural equation modelling (SEM). The findings indicated the human capital and human resources management practices are positively associated with organizational performance. Also, innovation mediates the relationship between the independent variables (human capital and human resource management practices) and organizational performance in the construction industry in Pakistan. This relationship was also found positive in several other studies such as Wang, et al., (2018) and Kangyin, et al., (2015) in China, etc.

An empirical study was conducted by Tessema (2014) investigated the impact of human capital on company performance in footwear sector in Ethiopia. This study adopted the human capital theory to address this issue. A survey research design was adopted to test the impact of human capital on company performance using a sample of 143 small scale footwear sector in Addis Ababa, Ethiopia. Estimation results using a regression model indicated that having human capital investment in company lead to the improved company performance.

Dahou and Hacini (2018) studied the influence of human capital as an intangible asset on the organization's performance. They explored the concept of human capital management and the impact of the balanced scorecard on it and the effect of both on firm performance. The model

was developed to include human capital management indicators, deducted from resource-based and motivation theories, competence and motivation and commitment. Data was collected from the four telecommunication organizations in Jordan, using 65 questionnaires. The hypotheses were tested using AMOS analysis to determine the impact of using balanced scorecard on human capital management and the impact of both variables on firm performance. The results revealed that the balanced scorecard has significant impact of effective human capital management and both have a positive effect on firm performance.

Odhon'g and Omole (2015) conducted a study that sought to establish the effect of human capital investment on organizational performance of pharmaceutical companies in Kenya. The independent variables included; training, education, knowledge management and skills development. The main underpinning theories in this study included human capital, skill acquisition and sustainable resource theory. The study collected data through a survey questionnaire with 200 observations. Descriptive and inferential statistics were used in the analysis. The study found a positive significant relationship between human capital investment and organizational performance.

3. Research methodology

3.1. Research Philosophy, Design and Sampling

This research adopted positivism philosophy which accords with survey research design with deductive approach in a cross-sectional survey (Saunders et al., 2007) targeting small and medium manufacturing firms in Rwanda. The study's target population consisted of 868 small and medium manufacturing firms legally operating in Rwanda (NISR, 2018). Qualified respondents were owners/ chief executive officers (CEOs) of these firms. The use of these senior managers as key informants was consistent with previous studies (Corstern and Felde, 2005). The rule of thumb of selecting appropriate sample size is to identify the number of parameters (i.e. measurement items) that should be multiplied with five or ten (Kline, 2015) also known as a subject-to-variable ratio of 5:1 or 10:1. With 24 questions multiplied by 10 subjects, the sample size was then 240 small and medium manufacturers purposely selected in the Rwandan manufacturing sector. A questionnaire was used to collect primary data from the qualified respondents (Hair et al., 2006; Malhotra and Birks, 2007). The questionnaire was based on a five (5) point Likert-type scale that enabled the collection of answers to specific closed research questions on performance of the firms in the market and the extent to which human capital and innovation capability were deployed in these firms.

3.2. Measurement of Variables

The study measured human capital -the independent variable- using five metrics: training, skills, knowledge, education and competence with each two items (making a total of 10 questions for this construct). In measuring firm performance, subjective (self-reported) measures by owners/ mangers were used which are consistent with earlier studies such as Spanos and Lioukas (2001); Nath et al., (2010); Chari and David, (2012). The firm performance consisted of seven questions that relates to sales growth, profit growth, market share growth, customer satisfaction and quality product. The mediating i.e. innovation variable consisted of seven items of which three were also adopted from previous studies; hence the study used a partially self-made questionnaire. The respondents were asked to give their responses based on a five-point Likert-type scale with 1= strongly disagree; 2= disagree, 3= Neutral, 4= agree; 5= strongly agree.

3.3. Model Specification

In this study, the measurement model has employed three variables namely; (i) human capital as a set of knowledge, skills and abilities that reside in the individual and that are used by him/her (Vidotto,et al., 2017). Human capital was conceptualized using five metrics: training, education, skills, knowledge and competence; (ii) Business performance as the level of achievement of business organization toward its goal is a dependent variable (DV)-also called criterion, presumed effect, response, measured outcome (Cooper and Schindler, 2014) and (iii) mediating variable (innovation) as summarized in the following table.

Table 3.1: Measurement Model

Nature of Variables	Latent Variable	Manifest/ / Observed	Indicator	M e a s u r e m e n t / Scale
<u>Dependent Variable</u>	Business Performance	Increased sales, increased profit, increased number of customers, good product quality		Interval (5-point scale)
<u>Independent Variable</u>	Human Capital	Training, education, skills, knowledge and competence		Interval(5-point scale)
<u>Mediating variable</u>	Innovation Capability	New product, new methods, new organizational form, new market, etc.		Interval(5-point scale)

Source: Researcher's compilation, 2019.

Therefore, this study modelled mathematically business performance (Y) as function of human capital (HC) and innovation (IC). To associate business performance with determining factors the study applied the following mathematical regression model:

(Y) Business performance= f (human capital+ innovation capability)

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + e \dots\dots\dots (3.1)$

Where,

Y= Business performance

X₁ and X₂ are human capital and innovation capability.

β₀ = Constant

β₁, β₂, β₃= Regression coefficients

e = error term.

3.4. Data Analysis Procedures

Based on the distribution of the descriptive statistics obtained from the study, analytical techniques were used to perform inferential analysis especially the regression analysis. According to Kothari and Garg (2014), regression is the determination of statistical relationship between two or more variables. In simple regression, there are only two variables, one variable (defined as independent) is the cause of the behavior of another one (defined as dependent variable). When there are two or more that two independent variables, the analysis concerning the relationship is known as multiple correlation and the equation describing such relationship as the multiple regression equation (Williman, 2011).

In this study the Multivariate Regression Model (MRM) was used to predict the relationship in the constructs. MRM was adopted because we sought to determine the nature of correlation between a single dependent variable (i.e. firm performance) and several independent variables (human capital and innovation). The rationale behind the use of MRM is that firm performance cannot be explained by one variable element that represents human capital rather the combined effect of these dimensions of human capital (knowledge, skill, training, education and competence) but also, human capital is not treated as the number of employees rather the quality of employee that is materialized by innovative capability. The result from the R² were used for the purpose of testing the hypotheses. Therefore, to test

the hypotheses the R^2 is adapted into p-statistics formula to arrive at the p-calculated value, which is then compared with the p-critical (table) value for rejection or acceptance criterion (Hair et al., 2009). Substantiating the use of MRM, Ezejelue (2008) asserted that it is therefore used to test whether two or more independent variables (measures on interval or ratio scale) affect a dependent variable (also measured on interval or ratio scale). All analyses were conducted using IBM SPSS and STATA computer package.

4. Analysis

4.1. Preliminary Data Analysis

The Statistical Package for Social Science (SPSS version 25.00) was used to screen the data of this research study in terms of data normality, outliers, missing data, etc. Using Kolmogorov-Smirnov test and Shapiro-Wilk test and skewness and kurtosis, results for both tests were found significant and those for skewness and kurtosis showed also that all data were normally distributed and do not suffer from skew and kurtosis (0 ± 1) as they were both found less than +1 which indicated no deviation from data normality. Therefore, there were further no missing values identified in data set and no outliers because the questionnaire was of five-point Likert type. By calculating the Mahalanobis d-squared distance, it was found that no observations exceed the threshold value of three, therefore, no data points are deleted from the analysis. These results are strong enough and necessary for further analysis. Furthermore, out of the 240 distributed questionnaires, 122 were returned of which 106 fully considered for further analysis thereby making a response rate of 46% greater than most of the reviewed empirical studies. The remaining sixteen were discarded because completed by unqualified respondents. The reliability for this study was measured by using Cronbach's Alpha coefficient. It was found that the dimensions of human capital have a Cronbach's Alpha values of 0.815, that of innovation 0.853 and 0.831 for firm performance which are higher than 0.7 as per Hair et al. (2007) recommendation. Indeed, the closer the reliability coefficient gets to 1.0, the better is. Therefore, this indicated that the variables were internally consistent and the scales deemed reliable for further analyses.

4.2. Demographics

Out of the 106 respondents, only 27 respondents (26%) were female in a male dominated manufacturing sector (74%); 60 respondents about 57% are in the age bracket of adulthood (40-59) with 34 (32%) falling in early adulthood (less than 40 years) and 11% of late adulthood (60 and above). Out of 106 respondents 58 did secondary school (55%), 36 (34%) had primary school level of education and only 11 (10%) had either diploma or degree. It was further found that most of firms 48 of surveyed companies (45%) are young i.e. less than 10 years while those at the early stage of growth i.e. between 11 and 25 were 54 exactly 50% and only 5% were categorized as survival firms with more than 25 years of existence i.e. created before the genocide against Tutsi in 1994. The respondent firms are almost all concentrated in Kigali city with 57 (54%) followed by Eastern province with 16 (15%) and Northern Province (15 (14%) while Southern province had 12 (11%) and only six (6%) for Western province. Sector wise, 31 (29%) are operating in food, beverage and tobacco sector followed by "Others" and "Textile, leather and clothing" with 17 (16%) each; furniture had 13 (12%) while wood, paper and printing had 11%. Chemicals, rubber and plastics 9 (9%) and nonmetallic minerals are less represented 7%.

Therefore, the findings about respondents and firms' characteristics align almost all with those found in previous studies (NISR, 2011, 2014 and 2017). The sector is young with most companies created after the genocide against Tutsi in 1994, male dominated with much more concentration in Kigali city.

4.3. Exploratory Factor Analysis (EFA)

EFA is used in order to ensure that constructs are aligned with their indicator variables since the researcher usually mixes hypothesized, empirical and theoretical measures of a construct from different setting without data. Researchers including Babyak and Green (2010) as cited by Ndekwa (2017) contended that in case of incongruence between the researcher, theory and data, a poor model fit will always result. Within this context, researchers are recommended to use EFA in order to identify a set of unobserved factors that reconstruct the complexity of the observed data in an essential form (Henson and Boateng, 2007 cited in Ndekwa, 2017). In this study, a conceptual model was built that integrates construct and indicators variables from different theories, empirical literature and expertise view without data. In the tentative for harmony of different dimensions of constructs, EFA was used as a

diagnostic tool to assess whether the collected data are in line with theoretically expected structure of construct used and determine if the measures used measured what they were intended to measure.

As a results of the EFA the Principal Components Analysis and orthogonal method with Varimax rotation, was conducted using STATA 14 to evaluate the underlying dimensions of the 24 items and the three latent variables and later to identify the number of components and factors emerging in the survey questionnaire. Discrimant validity was performed by testing the KMO and Bartlett's test of sphericity. The KMO statistics is a measure of sampling adequacy for overall models. According to Keiser (1970), when KMO statistics is less than 0.5, the constructs require remedial actions. On the other hand, Bartlett's test of sphericity tests the null hypothesis that correlation matrix is an identity matrix, implying that all of the variables are uncorrelated (Snedecor and Cochran, 1989).

Table 3.1: Results of Tests of Efficiency of PCA Method

Index	Bartlett's test of Sphericity	Kaiser-Meyer-Olkin (KMO) test
Human Capital Index	0.000	0.791
Innovation Index	0.000	0.780
Firm Performance Index	0.000	0.737

Source: From Principal Component Analysis using Stata 14

Therefore, the current values of KMO and Bartlett's tests found in Table 3.2 above implied that factor analysis has been useful for all chosen variables. On the other hand, the significant result (0.000) rejected the null hypothesis; implying then that all chosen variables were correlated adequately for EFA, hence the appropriateness of sample data for conducting factor analysis.

Table 3.2: Indices with number of components extracted

Index	Number of components with eigenvalue > 1	Proportion of variation Explained
Human Capital Index	2	87%
Innovation Index	2	75%
Firm Performance Index	2	70%

Source: From Principal Component Analysis using Stata 14

4.4.Summary Findings and Discussions

4.4.1. Multiple Regression Model Results

Table 4.3: Regression Analysis Results

Variables regressed	Coefficient	R-Squared	Adjusted r ²	F-Value	Significance	Interpretation	Decision on Ho
Performance-Human Capital	0.7471	0.6845	0.6815	225.64	0.000	Significant Effect	Rejected
Human capital-Innovation	1.028	0.7838	0.7812	379.85	0.000	Significant Effect	Rejected
Performance Hcap (predicted value for Reg. Humancapital Innov)	0.9935	0.948	0.9475	1,896.9	0.000	Significant Effect	Rejected

Source: Researcher's compilation, based on STATA results, 2019

The findings of this study provide some useful insights and information on the effect of human capital firm performance of Rwanda manufacturing sector as extant literature on this link is still very scanty. According to the Table 4. 3 above, 68%, of the variation in investment in human capital was explained by associate performance; 78% of investment in human capital was explained by associate innovation and 95% of investment in human capital and innovation was explained by associate performance. Further, the F-ratio tests whether the overall regression model is a good fit for the data. The output showed that the independent variables statistically significantly predict the dependent variable, $F(1,104) = 225.64, p < .0000$; $F(1,104)=379.85, p < .000$ and $F(1,104)=1,896.9, p < .0000$. This implies that the regression models are a good fit of the data). Likewise, results above revealed that there is a strong positive relationship between (i) human capital and performance (0.00), (ii) human capital and innovation (0.00) and innovation and performance (0.00). Therefore, it can be concluded that investment in human capital significantly influence performance of small and medium manufacturing companies in Rwanda and that this influence is highly reinforced when human capital is active with innovation capability.

4.4.2. Findings Discussions

This study was carried out to test three hypotheses, namely: (i) human capital does not affect firm performance, (ii) human capital does not influence innovation and (3) innovation does not mediate the relationship between human capital and performance relationship.

This study considered one dependent variable i.e. firm performance; according to the first hypothesis tested, there is a strong and positive relationship between human capital and firm performance at a significant level of 0.05 (sig. 0.00). Therefore, finding of this study revealed that other factors kept constant, performance of manufacturing companies in Rwanda depends upon the level of investment in human capital. This finding implies that companies with strong human capital in terms of quality, will outperform competitors in the industry. The findings of this study further aligns with those of Odhon'g and Omole (2015), Tessema (2014) Perera and Thrikawala (2012), Dahou and Hacini (2018) Selvarajan et al., (2007) Ukenna et al., (2010), etc. that found in other contexts a positive significant relationship between human capital investment and organizational performance.

The second hypothesis concerned the effect of human capital on innovation. The finding revealed a positive and strong relationship between the two variables at significant level of 0.05 (sig.0.00), confirming then the influence of human capital on innovation. This finding further aligns with those of Mahemba and Bruijin (2003), Van Uden, Knoben and Vermeulen (2014), etc. which find also this relationship strong and positive. The foregoing discussion showed that human capital is of significant importance to spur innovative output in Rwanda, more specifically, manufacturing companies can enhance their innovative output by giving employees the ability to develop themselves by formal training for instance.

Finally, the third hypothesis tested was innovation capability mediates the relationship between human capital and firm performance. The finding revealed that investing into innovated human capital influence firm performance of manufacturing companies in Rwanda. This finding goes in line with the findings of Sarwar et al., (2016); Wang, et al., (2018) and Kangyin, et al., (2015) who found the mediating effect in the relationship between human capital and firm performance. The implications of this finding are that human capital influences firm performance but this influence becomes higher when mediated by innovation that becomes therefore a pre-requisite and associated to growth, performance, competitiveness, increase in profits as well as long term survival of organizations (Pletcher and Mann, 2013; Bowen and Steel, 2010) and that human capital outputs are valued through innovation outputs. So, as per the findings, both human capital and innovation are needed to enhance firm performance.

As per the literature, human capital represents training, skills, knowledge, education and competence of organizational employees as conceptualized in the human capital theory that holds that individuals with more or higher human capital achieve higher performance when executing tasks (Becker 1964) cited in Tessema (2015). Hence, investing in human capital should include all the expenses incurred on enhancing those indicators as they are proven to be determinants of performance heterogeneity among competing firms. The finding support further the resource based theory that suggests that internal resources that include human capital are crucial to sustained effectiveness and business performance Wright et al., (1994). So, the human capital theory and the resource-based view apply also to Rwandan small and medium manufacturing companies.

5. Conclusion and recommendations

5.1. Conclusion, Implications and Recommendations

In this study, a conceptual model has been developed that focuses on the Rwandan manufacturing sector. Five distinct dimensions have been identified on the basis of overall human capital of manufacturing firms. The study results confirmed previous studies that linked firm performance to human capital and therefore positively tested the human capital theory and the resource based view.

Therefore, the value of this research lies in the fact that it revealed the importance and magnitude of training, skills, knowledge, education and competencies in human capital effectiveness. Even if they cannot go back to school and with the willing to resist and compete with other in the region, staffs in manufacturing sector require continuous training to sharpen their knowledge while revitalizing their skills and competence. Any business being it small or medium needs also to continuously train their staffs to acquire state-of-art skills to deliver quality products, which in turn, can lead to higher firm performance and competitive advantage. It is only by this way, everything being equals, that Rwandan manufacturing companies may be able to position themselves and compete in the enlarged African continental market. So, managerial implications are that managers should put additional emphasis on quality human capital as it is an important element for achieving overall performance and sustained competitive advantage if really they want to compete in the AfCFTA.

Finally, this study offers a combination of academic contributions, for scholars and researchers and managerial implications, for policy makers and practitioners. Together, policy makers and managers can design suitable strategies and programs to address factors which are important in the achievement of successful innovation; thereby exposes policy makers to areas of interventions in ensuring that the SMEs in Rwanda appropriately prepared and positioned to compete in the AfCFTA. For instance, this study recommended to:

- rebrand the Technical and Vocational Education and Training (TVET) program in order to be market-oriented, lucrative and attractive to young people and the society at large (the TVET is mistakenly considered as intended for less gifted students);
- link the private sector to education institutions in development of curriculum to match education with the active skill needs of the labor market and reinforce this linkage in terms of mandatory internship after graduating;
- improve the quality of TVET for out-of-school youth and tertiary education by closer monitoring and evaluation in order to improve the skill base of the labor force.
- through National Industrial Research and Development Agency (NIRDA), provide financial incentives (subsidies) to firm that embark on innovation (Research and development).
- encourage firms to establish close ties with academic institutions to maintain ongoing relationships and gain the benefits of talent recruitment, technology transfer, research development capability and innovation stimulation.

5.2. Limitation and Future research recommendations

Apart from training, skills, education, knowledge and competence there is a number of other factors that can also predict firm performance in the context of human capital for small and medium manufacturing companies. The study further was a cross sectional one which used a self-reported perception of owners to measure firm performance and cannot assume to be replicable to context with longitudinal data. The foregoing shortcomings of this study uncover potential areas for further research in that other variables apart from the five used herein can be studied to unearth their predictability of firm performance. Also, the study covered only manufacturing sector, the services sector may change the game.

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Can Rwanda Benefit From East African Monetary Union Adoption?

By MR. Rafiki Murenzi

Abstract

Rwanda considers its participation in regional economic integration and international trade as one of the crucial elements to promote trade with its economic partners. Currently Rwanda participate in different regional economic bodies (EAC, COMESA, CPGL, etc...) and have satisfied different requirement to become a party of the African Continental Free Trade. Empirical analysis of this study has two main sections, the first section consist of the feasibility and implication of the East African Community Monetary Union and the second section seek to establish whether the EAC setup of monetary union policy with EAC member countries can affect Rwandan trade flows growth as a whole with its African trade partners in the context of a dynamic stochastic general equilibrium trade model. The first analysis found that the inflation rate for countries still need improvement while for the real GDP growth Rwanda and Burundi are not ready yet, even though according to World Bank prediction, Rwanda might be ready by year 2024. The second section use historical data for twenty-two years we apply PPML gravity models, we discovered strong and striking empirical results. Findings shows that regressors act interdependently, such that enhancing one sector could induce growth in another. The estimation of this model's coefficient leads to significant negative coefficients for exchange rate fluctuation while using an assumption of currency union within east African community shows the possibility of a positive coefficient of a currency union. Findings also help in identifying which types of trading frictions are reduced by a currency union, the study found that adopting the monetary union will not only increase trade flows between Rwanda's trade partner countries but also will positively affect the contribution of other economic factors like GDP and market size of the region to growth of trade flows. To note that all benefit from single currency depend upon long-term credibility of the union.

Keywords: monetary union, Trade flows, exchange rate fluctuation, Inflation rate, Broad money ratio (M2/GDP) and Gravity model.

1. Introduction

1.1. Background of the study

The EAC is preparing to launch the use of common currency by year 2024 and this is expected to boost trade flows within the region as well with all trade partners. growth, employment as well as a healthy budget among EAC country members. Having a monetary union can play a key role in completing the single market; and as such can enhance trade among monetary union member states. East African Monetary Union (EAMU) is an important stage in the process of regional integration. East Africa Community member countries are at time to converge their currencies into a single currency where they are trying to harmonize: monetary and fiscal policies, financial payment and settlement systems, financial accounting and reporting, policies and standards on statistical information and establish an East African central bank.

Monetary union is not new subject in EAC region. The EAC of 1967-77 aimed at a common market, a common customs tariff and a range of public services so as to achieve balanced economic growth within the region. It was already a monetary union with a currency board and a parity currency (1 Uganda Sh = 1 Kenya Sh = 1 Tanzania Sh). This monetary union failed mainly due to lack of strong political will, lack of strong participation from the private sector and the civil society in the cooperation activities, the continued disproportionate sharing of benefits of the Community among the Partner States due to their differences in their levels of development and lack of adequate policies to address this situation.

Many economic researches worked on the impact of monetary union on trade in regional integration have shown that there is a positive impact of common currency on trade volume for integrated regions. Rose's findings showed a strong negative impact of exchange rate volatility on trade and developed a new theory that there is strong positive effect of a common currency on trade. In addition, Rose has demonstrated that there is no trade diversion or change in supply for non-members due to growth of trade within the monetary union region. The benefits manifest themselves through large increases in trade within the currency union ranging from 92% to 266% of growth, results obtained by estimating gravity equations of bilateral trade (Glick and Rose 2001).

Monetary union can be defined as cooperative arrangements, whereby two or more countries peg or freeze their exchange rates at a constant rate, in order to keep the value of their currency at a certain level and avoid uncertainty caused by volatile exchange rates (Arestis and Sawyer 2010). All this involve an arrangement and to make such arrangement stable, some countries go an extra mile and issue a single currency, as it was the case for the European Monetary Union (EMU).

The benefit of monetary union in EAC is first to remove the cost of converting currency by traders. Secondly is to increasing the price transparency and make easier the price comparison this should help firms cut costs because they will be exposed to cheaper products in an easy way. Thirdly, to Boost inward investment as we expect the single market to increase the number of consumer and also increase the inward investment from the rest of the world in EAC. Fourth is to avoid exchange rate uncertainty; the bilateral trade flows is mostly affected by the exchange rate volatility, it may affect trader positively or negatively, When against you it could end up costing you a lot more, this sort of uncertainty can hinder trade, particularly for smaller firms.

Many literatures worked on EAC performance, found that they still have a long journey to achieve the requirement for monetary union.(Shepherd 2010) working on trade performance, findings report support 3 major policies. First was that EAC countries may boost their trade by making some reforms in trade, secondly was that he relatively high level of tariffs in the region should be reduced over time and finally Improving the trade facilitation and logistics environment should be a priority, because of its potential to boost trade in industrial products. Other work on eac trade flows performance like (Shinyekwa and Othieno 2013) highlights that although progress has been made in other areas, there are challenges that need to be addressed to deepen the EAC integration: lack of a common policy with regard to partner states, the lack of standardized customs formalities; the lack of harmonized procedures; and other methods to promote investment and trade. for more details on trade flows performance in EAC. see (Buigut 2012) and (Duncan Ouma 2017).

This paper using methodologies from WTO report 2016 (Yotov et al., n.d.), attempt quantitatively to test the hypothesis that there is no effect of the monetary union on trade flows among EAC's country members once EAMU policy is adopted, in this case, we can reject at standard significance levels. (Szebeni 2004) have shown that the combined estimate implies that currency union approximately double trade and the estimate are heterogeneous and consistently ties to the feature of the study.

In this study we use Gravity model for international trade; many studies has proven that trade flows (both import and export) between two countries depends on their economic masses (national income or gross domestic product) and negatively related to trade costs between them. Gravity model fits important stylized facts and can easily be used to real data to explain trade flows with respect to policy factors. We estimate parameters using PPML (Poisson Pseudo-Maximum Likelihood) in order to deal with zero trade flows problems and it gives unbiased estimates when there is heteroscedasticity in error terms. Gravity model is a simulation model with aim to replicate economic phenomenon and its impact then attempt to make predictions based on past performance.

The main objective of this study is to estimate the risk or benefit for EAC country members from the use of common currency. This study assesses the impact and consequences of implementing a common currency in EAC country members and the direct impact regional trade in general. (Rose 2000) using gravity model, proved that using a common currency strengthen trade among members. Having a monetary union can play a key role in completing the single market; and as such can enhance trade among monetary union member states. This paper will examine which challenges or benefit Rwanda is probably going to face during monetary union policy implementation.

1.2. History of monetary union in EAC

The East African Community between 1967-1977 had a common market, a common customs tariff and a range of public services so as to achieve balanced economic growth within the region. There was already a monetary union with one currency board and a parity currency (1 Uganda Sh = 1 Kenya Sh = 1 Tanzania Sh). Public enterprises included East African Railways and Harbours, East African Airways, East African Posts and Telecommunications and East African Development Bank (EADB).

Common market allowed Citizens of the community moved and worked across the region, for both professionals and casual labourers. This regional bloc presented a large market with a high attraction to foreign direct investment with multiple nationals establishing themselves in the region. Other strength to the region was education, the adoption of a single syllabus and a single examination body within the region, the establishment of the University of East Africa with specialised colleges in each country which later engaged in publishing, the Inter-University Council of East Africa, and others.

EADB was established in 1967 under treaties of the then East African Cooperation between Kenya, Tanzania, and Uganda with mission to allocate funds and reduce industrial disparities. The other concerns with relative importance of EADB as a source of finance for project in comparison with other non-bank sources. Later it was found that EADB was not an effective instrument to reduce the industrial imbalance between Kenya and the other two countries due to three main reasons. First, the EADB did not have adequate funds. Second, Finance absorption was higher than either in Uganda or in Tanzania and EADB had hardly any power over that factor. Third, the EADB'S contribution of finance to the cost of projects was very small. Fourth, Kenya's capacity to generate investment was far higher compared to other member states. Finally EADB found powerless to solve those issues.

In 1977, East African Currency Board Failed and established three separate Central Banks, destroying hopes for a monetary union. The failure of the first East African Community was disastrous. The borders were closed, there were no inter-country railways, no trade between countries, no airways, This was among reasons of the conflicts between Tanzania and Uganda that led to a war in 1978-79. The three state members did not pay their common debts after breakdown, they also had common liabilities taken to development infrastructure like railway wagons to the World Bank and to many other governments, which they had to re-pay as a Community.

The collapse of the first integration were mainly Caused by The "lack of strong political will, lack of strong involvement of private sector and the civil society, increase in non fair distribution of benefits of the Community among the member States due to their differences in their levels of development as well as the lack of adequate policies to solve this issue".

2. Literature review

The history of the gravity model begins with (Tinbergen 1965) and Pöyhönen (1963), where they proved theoretically that exports are positively affected by the size of the economy among trading countries and that distance (used as the proxy for freight and home bias) can be expected to have a negative effect on exports. Between 1970's and 1980's many researches published tried to examine the perfect way to justify and estimate the gravity model, (Anderson 1979) made the first formal attempt to prove the efficacy of gravity equations, followed by (Bergstrand 1985) He also investigates theoretically how to determine trade flows between two trading country in a series of articles where he proved that gravity equations are associated with simple models of monopolistic competition. (Helpman and Krugman 1985) Used a differentiated product with increasing returns and imperfect competition to explain and justify the gravity model, However (Deardorff 1995) showed that gravity model have characteristic of many other models and can be justified using standard trade theories and that as gravity model characterizes many models, its use to test any of them is suspect.

Gravity model became more famous in the beginning of 20th century, due to its applicability by many economic researchers and its contribution to more trade data advance analysis. The most well-known benchmark so far of this period is (Anderson and Van Wincoop 2003) this research develop a method that consistently and efficiently estimates a theoretical gravity equation and correctly calculates the comparative statics of trade frictions, finally it applies the method to solve the famous McCallum border puzzle. Applying this method, it finds that national borders reduce trade between industrialized countries by moderate amounts of 20-50 percent. The other famous paper was (Jeffrey A. Frankel 1998) where he agrees that the gravity equation seems to be consistent with a large class of models, rather than the gravity equation appears to "characterize" a large class of models. There many researches done on trade policy analysis using gravity equation, other studies to be quoted are: (Fontagné and Freudenberg 1997).

Many works have been made to test the effect of monetary union on bilateral trade flows. (Feldstein 1991), (Obstfeld 1997) and (Wyplosz 1997) Came out with the same findings that the gains from eliminating exchange rate volatility within Europe have a small on trade flows trading partners. (Michael Emerson et al. 1992) using gravity equation showed the potential benefits of adopting a currency union on microeconomics efficiency, macroeconomic stability (through inflation, production and employment) and on trade flows among trading countries. (Glick and Rose 2001) Assess effects of exchange rate volatility and currency unions on international trade and showed that the effect is statistically significant and conclude that countries that share a single currency trade three times as much as they would with different currencies. In 2010 (Costa-Font 2010) whilst the "exchange rate volatility effect" of a common currency was significant, the pure currency union effect was found to be almost negligible in the same way (Aristovnik and Meze 2010) show that the trade among the members of the EMU has grown on average by 10-15 % due to the use of a common currency and there was also an increase in trade with the non-member states.

Many other researches on worked on currency effect during regional integration founds that this has a big impact on trade flows such as (Szebeni 2004) and (Glick and Rose 2016), other researches have proven to have a negligible effect on trade among partner countries such as (Frankel et al. 1997), (Aristovnik and Meze 2010) and (Miron, Miclaus, and Vamvu 2013). This study we show which effect the exchange rate has on EAC country members trade flows and examine the impact that could have common currency on EAC country members in case we set up monetary union policy.

The traditional gravity equation has shown to be inconsistent with the zero trade flows issues, as the logarithm transformation automatically remove data for which the reported trade value is zero. (Silva and Tenreyro 2006) highlight the consistency of the OLS estimator typically used in the log-linear form depends on an unrealistic assumption of the error term () that they are not heteroskedastic and recommended the estimation of the gravity model in its original multiplicative form. To achieve that, they suggested a Poisson pseudo maximum likelihood (PPML) method. (Silva and Tenreyro 2006) compared the PPML methods with OLS and found evidence of the PPML's approach superiority. This theory were late approved by studies like (Martin and Pham 2015) proved that PPML approach handle well the heteroskedasticity when is the only problem and it may lead to bias estimates when zero trade values are frequent. But (Manning and Mullahy 2001) examined how well the alternative estimators behave econometrically in terms of bias and precision when the data are skewed or have other common data problems (heteroscedasticity, heavy tails, etc.) and find out that no single alternative is best under all conditions examined.

3. Methodology

3.1 Gravity model specification

Gravity model of international trade comes from the theory of Newton's law of universal gravitation which states that every two masses M_i and M_j exert on each other a gravitational force F_{ij} which is directly proportional to the product of their masses and inversely proportional to the square of the distance D_{ij} between their centers.

$$F = G \frac{M_i M_j}{D_{ij}^2}$$

Jan Tinbergen (1962) used an analogy with Newton's universal law of gravitation to describe the patterns of expected bilateral amount of trade flows between two countries i and j (T_{ij}) saying that is "proportional to the gross national products of those countries and inversely proportional to the distance between them". The multiplicative form of gravity model is given by:

$$T_{ij} = K \frac{(GDP_i)^\alpha * (GDP_j)^\beta}{D_{ij}^\epsilon}$$

Where GDP_i and GDP_j represent respectively the gross domestic product exporter country and importer country, D_{ij} is the geographic distance between countries, and α, β and ϵ are additional (besides K) free parameters where the gravity model assume that they are all equal or approximately equal to one. This theory between gravity model of trade and Newton's law of universal gravitational, however, often this analogue comes up against the observation that in real life there is no set of parameters for which equation (1) holds exactly for an arbitrary set of observations. Even with a more relevant constant the prediction does not fit the data well, suggesting that Newton's value of 2 for the exponent of distance, based on physical principles, should be replaced by a value appropriate to the data and the exponents equal to 1 for the mass variables should be replaced by exponents that improve the fit of the prediction to the data.

The most prevalent approach to estimate the multiplicative gravity model for trade given by Eq. (2) is to use a log-linear transformation expressed as:

$$\ln(T_{ijt}) = \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(D_{ijt}) + \varepsilon_{ijt}$$

The basic gravity model is often expanded by including other additional variables, which are thought to explain the impact of various policy issues on trade flows. Equation (4) shows the added independent variables denoted by X_{ijt} that affect bilateral trade flows with β'_n as parameters.

$$\ln(T_{ijt}) = \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(D_{ijt}) + \beta'_n \sum_{n=1} X_{ijt} + \varepsilon_{ijt}$$

Using a different facts, many recent studies by (Silva and Tenreyro 2006) proved weaknesses of the original log-linear transformation in estimating the gravity model coefficients. (Silva and Tenreyro 2006) showed that the consistency of the OLS estimator typically used in the log-linear form depends on an unrealistic assumption of the error term (ε_{ijt}) that they are not heteroskedastic and recommended the estimation of the gravity model in its original multiplicative form. To achieve that, they suggested a Poisson pseudo maximum likelihood (PPML) method. (Silva and Tenreyro 2006) compared the PPML methods with OLS and found evidence of the former's superiority.

In this study, we use PPML estimates gravity models in their multiplicative form via Poisson Pseudo Maximum Likelihood. that include other variable that can have an impact on regional trade areas as well as currency union. Many monetary unions reflect a historical relationship, like colonization. We assume that the currency union variable, CU, and other regressors in the gravity model are exogenous and that included controls that correlate with both trade and currency union dummy variable.

3.2 Poisson Pseudo Maximum Likelihood Gravity model

PPML is an estimation method for gravity models belonging to generalized linear models. It is estimated via generalized linear model using the pseudo-poisson distribution to estimate the gravity model in its multiplicative form.

In practice the exporter denoted by i and importer denoted by j , the trade flows T_{ij} should satisfy:

$$T_{ij} = \frac{GDP_i}{\pi_i^{-\theta}} \cdot D_{ij}^{-\theta} \cdot \frac{GDP_j}{P_j^{-\theta}}$$

Where the parameter θ represent the elasticity of trade flows to trade cost $P_j^{-\theta}$ and $\pi_i^{-\theta}$ represent respectively inward and outward" resistance indexes) they are also called "multilateral resistance". For consistency with the "structural gravity" of trade flows both multilateral resistance $\pi_i^{-\theta}$ and $\pi_i^{-\theta}$ satisfy:

$$P_j^{-\theta} = \frac{GDP_i}{\pi_i^{-\theta}} \cdot D_{ij}^{-\theta} \quad \pi_i^{-\theta}$$

$$pi_i^{-\theta} = \frac{GDP_j}{P_j^{-\theta}} \cdot D_{ij}^{-\theta}$$

All the above models, the inward multilateral resistance index $P_j^{-\theta}$ reflect a function of the price indices in the importing market. And $pi_i^{-\theta}$ captures the level of competition faced by exporter or in other words the dependence of economy of country 's exports on trade costs across all destination markets.

gravity with fixed effect.

In estimating equation (5), there is two different method of dealing with importer $\frac{GDP_i}{\pi_i^{-\theta}}$ and exporter $\frac{GDP_j}{P_j^{-\theta}} \cdot D_{ij}^{-\theta}$ terms.

The first method also called the reduced-form it introduce the importer and exporter without any assumption of constraint on these terms. This method do not take into account for consistency with the "structural gravity" of trade flows proposed in equation (6) and (7), the estimated model can be summarized as follow:

$$T_{ij} = \exp[e_i - \theta \log(D_{ij}) + m_j] \cdot \epsilon_{ij}$$

Where e_i and m_j represent respectively invariant across export and import and ϵ_{ij} are error terms. Note that the $\log D_{ij}$ can be the linear combination of the log of distance and dummies for free Trade agreements, common language, common colonizer etc.

Parameter estimation

The Poisson regression model is given in general by the following discrete distribution:

$$Pr(X_{ij} = k | \hat{X}_{ij}) = \frac{e^{-\hat{X}_{ij}} \times (\hat{X}_{ij})^k}{k!}$$

The mean value and variance for the poisson distribution model using export are given by:

$$E[X_{ij}] = Var[X_{ij}] = \hat{X}_{ij}$$

Applying the log likelihood function on equation (9) we get:

$$\log(L) = \sum_{ij} \log(\Pr(X_{ij} \mid \hat{X}_{ij})) = \sum_{ij} -X_{ij} + X_{ij} \times \log(\hat{X}_{ij}) - \log(X_{ij}!)$$

In this study the heteroscedasticity is handled using the robust variance covariance matrix. To check the dispersion to the mean according to (10), we use the coefficient of variation $1/\sqrt{\hat{X}_{ij}}$. When needed zero observations can be included into the poisson maximum likelihood regression. To note that data do not need to follow the poisson distribution, no matter the distribution this approach provide consistent estimates.

$$\log(L) = \sum_{ij} X_{ij} \times \log\left(\frac{X_{ij}}{\hat{X}_{ij}}\right) - X_{ij} + \hat{X}_{ij}$$

3.3. Description and definitions of variables

This paper used panel data from UNCOMTRADE, IMF, World bank and WTO. The sample consists of data from 1997 up to 2017 using 42 African countries and other 14 countries with high weight on Rwandan trade. We choose that all data have the same source as gravity model of trade has some same features as other comparative studies, for a better comparison, data have to have the same source.

the variables we use are:

- **Trade flows:** We use natural logarithm of trade term which is the natural log of the sum of exports and imports between two countries.
- **Currency union:** Is a dummy variable which assign a value of 1 when two countries use the same currency and is 0 otherwise.
- **Distance:** stand for the natural logarithm of distance in kilometers between economic centres of the trading partners.
- **GDP:** The GDP term is the log of the product of the GDPs of the two countries.
- **RTA:** Regional trade agreement
- **Common colonizer:** According to WTO the common colonizer dummy is 1 if the two countries were colonies after 1945 and had a common colonizer.
- **Exchange rate:** is the real exchange rate between the currency of the exporting country and that of the importing country. It is measured as the ratio of the real value of the exporter's currency in US dollars to the real value of the importer's currency in US dollars.
- **Language:** is a dummy variable which is 1, if both country has a common official language or the language is understood by both countries.
- **Land locked:** is a dummy variable which equal to 1 if the country is land locked and 0 otherwise.
- **Border:** The border dummy is 1 if the two countries share a common land border.
- **Area:** is used as a proxy for market size, is the log product of both area

To note that when testing the impact of Monetary union, in the model without the common currency, we include Importer and export real exchange rate to have control on the exchange rate. Importer and export real exchange rate are both in local currency units per USD. Previous research using the gravity model has also sought to evaluate the impact of various regressors basing most on countries with high share in trade partnership. This study use 42 African countries that are the most partner intrade with Rwanda, while we use also other non-African countries which has a high share of import and export with Rwanda.

List of African countries used as Rwandan's trade partners

Table 1: List of countries					
Kenya	Uganda	Congo Dem. Rep.	Tanzania	South Africa	Burundi
Zambia	Egypt	Malawi	Ethiopia	Mauritius	Sudan
Morocco	South Sudan	Mauritania	Nigeria	Gabon	Zimbabwe
Mozambique	Mali	Madagascar	Togo	Angola	Namibia
Liberia	Ivory cost	Senegal	Cameroon	Eritrea	Congo Rep.
Botswana	Central Afr. Rep.	Sierra-Leone	Seychelles	Chad	Algeria
Niger	Benin	Burkina Faso	Guinea	Ghana	Tunisia

List of other influential Rwandan's trade patners used

Table 2: List of other Rwandan's trade patners countries						
China	United Arab Emirates	India	Germany	United States	Belgium	Japan
Turkey	Russian Federation	France	south Korea Rep.	Singapore	Sweden	Canada

4. Results

4.1. Feasibility of the East African Community Monetary Union

This section discusses the estimation results. This study prefers to use only those country pairs with which Rwanda has a high weight of trade flows. Fact that the common currency is believed to reduce the fixed costs of goods entering to the Rwandan markets as well as the elimination of the risk arising from exchange-rate fluctuations, and thus increase the volume of trade flows among county' members.

The East African Community country members signed a joint protocol and agreed on the process and convergence criteria for an EAC monetary union. These agreements represents a further step toward the setting up of East African Monetary Union. This came after ratification of the protocols for a customs union (2005) and the common market (2010). Envisaged in 2024 is the introduction of a single currency to replace the existing national currencies of member countries.

Before examining the role of monetary union, we first need to examine the role of monetary policy to adopt so that the assumption for the effect of monetary union on trade would not be affected by external factors. For the convergence to work, country members agreed to have a ceiling inflation rate not more than 5%, non-divergence in their ratio of broad money relative to the gross domestic product(M2/GDP ratio) and a converging real GDP growth not less than 7% as well as general government debt not exceeding 50%.

The first criteria set by EAC' s for the EAMU, was to have an inflation rate not more than 5%. The homogeneity in the inflation rate is necessary, for countries to be good candidates for a currency union, the patterns of inflation should be similar as this can make the convergence in inflation rates easier once they belong to a currency union, as different inflation rates shocks imply difference in economic policies as well as their economic structures. The homogeneity in inflations allows economies to re-equilibrate almost automatically.

Inflation rates in the EAC have been highly fluctuating over time in the last decade, where from 2013 to 2017,member states show an improvement to achieve the target except Burundi. The inflation rate on average of Rwanda is 5.1%, Kenya is 6.9%, Burundi is 7.9%, Tanzania is 5.6% and Uganda is 4.9%. The homogeneity in the inflation shock is also to be considered, member states to be good candidates for a currency union, the patterns of inflation should be similar as this can make the convergence in

inflation rates easier once they belong to a currency union. The table below shows the correlation in inflation rate between year 2009-2017.

Table 3: Correlation matrix of inflation rate among EAC members

	BURUNDI	KENYA	RWANDA	UGANDA	TANZANIA
BURUNDI	1.00	0.12	0.33	0.41	0.13
KENYA	0.12	1.00	0.36	0.34	0.44
RWANDA	0.33	0.36	1.00	0.28	0.51
UGANDA	0.41	0.34	0.28	1.00	0.50
TANZANIA	0.13	0.44	0.51	0.50	1.00

Results illustrated in the above table, shows a high divergence of the correlation coefficient for the EAC inflation rate this divergence indicate differences in the way country state have conducted their economic policies. Comparing the divergence, in inflation is very low even though it still need some commitment. This implies that EAC countries still need time to converge in terms of inflation pressure, since the correlation coefficient of the four countries, namely Uganda, Tanzania, Kenya, Rwanda and Burundi are low especially Burundi and suggesting that member states should press ahead on their journey toward inflation targeting.

The second condition is to check the ratio of broad money, relative to the gross domestic product which is considers as a proxy variable for determining the performance of financial markets in developing countries as the effectiveness of a single currency depends also on the level of development of financial market for the country in question. We use this ratio to reflect the size of financial sector development vis a vis gross domestic product, debt of financial sector and motivation toward investment of population within EAC's state members.

The second criteria set by EAC for the EAMU, was to have broad money ratio (M2/GDP) not less than 20%. Broad money ratio in the EAC is at a good level, where since 2014 to 2017, the Broad money ratio on average of Rwanda is 20.2%, Kenya is 40.6%, Burundi is 25.3%, Tanzania is 23.1% and Uganda is 22.3%. For a well functioning of the envisaged EAC monetary union, the broad money ratio need to be homogeneous within the region. The table below illustrate the correlation in broad money ratio (M2/ GDP ratio) of EAC country members between year 2009-2017.

The table below illustrate the correlation in broad money of EAC country members between year 2009-2017.

Table 4: Correlation matrix of M2/GDP for EAC between 2009-2017

	BURUNDI	KENYA	RWANDA	UGANDA	TANZANIA
BURUNDI	1.00	0.82	0.74	0.44	0.68
KENYA	0.82	1.00	0.90	0.78	0.61
RWANDA	0.74	0.90	1.00	0.63	0.62
UGANDA	0.54	0.78	0.63	1.00	0.70
TANZANIA	0.68	0.61	0.62	0.70	1.00

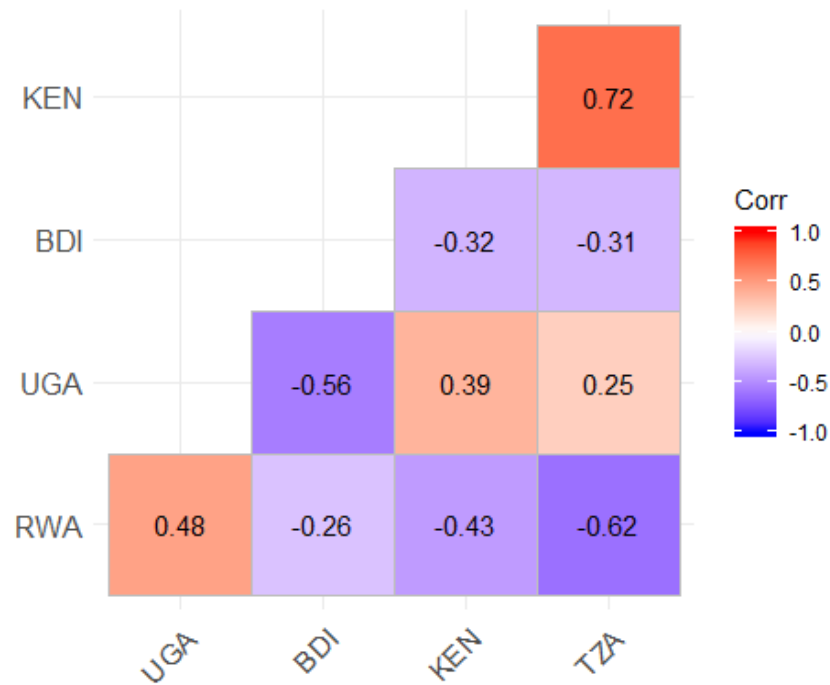
Table 4. below indicates a high degree of monetization for Burundi, Rwanda, Uganda, and Kenya, while Uganda shows a low level of monetized economy.

However, the overall results also suggest that there has been a considerable convergence in the size of financial intermediary sectors for most of the EAC countries, which gives hope to the possibility of a successful of EAMU.

The third condition factor is the real GDP growth. For adopting currency Union within this region, the real GDP growth rate is another important factor to be considered because if there is a big divergence in their real growth rate, forming a monetary union is not a good decision. Higher is the degree of real GDP divergence greater is the need for flexibility in the labour market to make a smooth functioning single union. The third criteria set by EAC for the EAMU, was to have GDP growth rate not less than 7%. The real GDP of 7% per year still a challenge that can not be expected by 2024. As from 2014 to 2017, the GDP growth rate on average of Rwanda is 7.13%, Kenya is 5.45%, Burundi is 0.06%, Tanzania is 7.01% and Uganda is 4.73%.

Recent studies shows that the fastest-growing Country would suffer in a monetary union with slower growing countries because trade flows of the fastest-growing Country, which are unconstrained with trade barriers, would increase faster than its exports, leaving it with a mounting current account deficit.

Figure 1: correlation matrix for real GDP growth between the year 2013-2017



This study check the homogeneity in GDP growth as the fast growing Country may suffer in a monetary union with slower growing countries because trade flows of the fastest-growing Country, which are unconstrained with trade barriers, would increase faster than its exports, leaving it with a mounting current account deficit.

Figure 1. Above suggest that the envisaged EAC-MU might work best if it starts by including only the countries with at least reasonable correlation rate in their real GDP growth rate, and these are Kenya, Uganda, and Tanzania. Prior to joining the EAC, Rwanda and Burundi's vital signs is still considered the weakest in the region. Burundi and Rwanda do not shows a fair degree of convergence, especially Burundi with a poor growth still have a long journey to go that is difficult to be achieve by 2024. According to word bank expectation, result shows that by 2024 the Rwandan real GDP growth might be at a good level for EAMU adoption, which is not the case for Burundi.

4.2. Impact of EAMU on trade flows

This section discusses the estimation results using gravity model of trade. This study prefers to use only those country pairs with which Rwanda has a high weight of trade flows. Fact that the common currency is believed to reduce the fixed costs of goods entering to the Rwandan markets as well as the elimination of the risk arising from exchange-rate fluctuations, and thus increase the volume of trade flows among county' members.

Figure 1: shows the real total value(in USD) of trade flows between Rwanda and its partner for each of the four EAC member countries (Kenya, Tanzania, Uganda and Burundi).

Figure 2: Value of trade flows in USD by member country with Rwanda

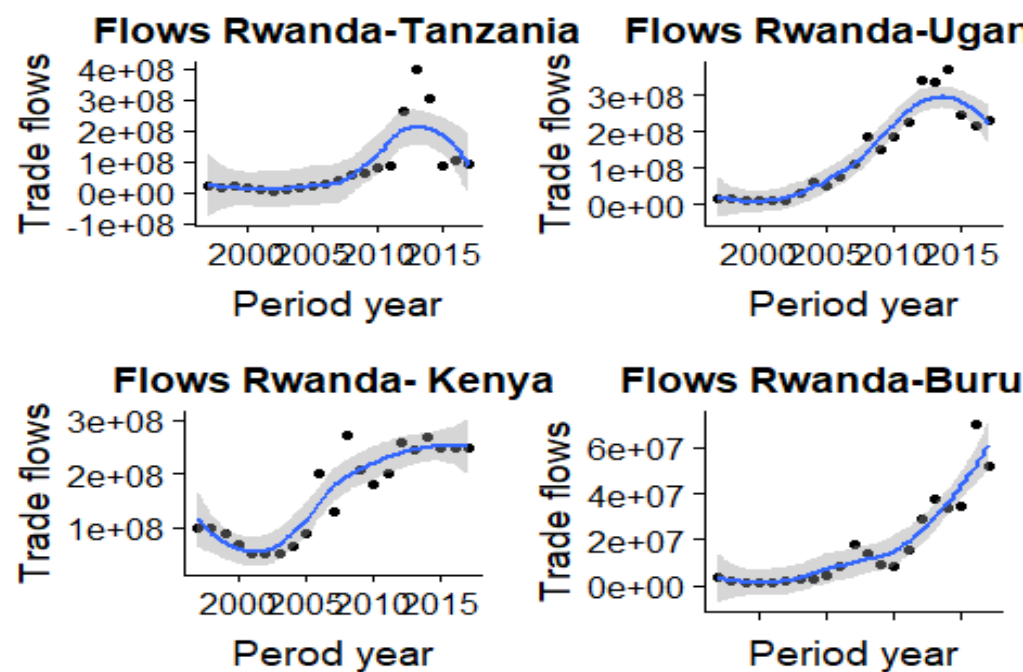


Figure above, illustrate a large differences in terms of trade shocks across EAC country members , the informative content of the series is uncertain but the inter-partner country flows have largely been increasing from 2007/2017 generally due to the integration of Rwanda in EAC. Trade flows between Rwanda and the EAC has increase from USD 340 million in 2008 to USD 544 million in 2016, which represent a growth of 6.7% per annum on average. Total export growth averaged 17% over the past nine years with total exports amounting to USD 148 million in 2016 from USD 42 million in 2008. Since the introduction of Rwanda to EAC Uganda and Kenya continued to have big shares of Rwanda imports and export from EAC region where they contributed 42.9 and 37.3 percent on average respectively. This means that around than 80 percent on average of trade flows are from Uganda and Kenya between year 2008 and 2017. Annual performance of export and import volumes shows a good trend for Kenya and Tanzania, while trade volume to Uganda decreased considerably in 2017. As conclusion, we can observe impact of difference regional integration stage on Rwanda, however there is other factors that contributed to this growth.

Many monetary union, have shown a historical correlation such as country with same colonizer. This study check the multi-collinearity nuisance factors of regressors to ensure that the coefficient estimated for the common currency regressor is appropriate and that the correlation between bilateral trade and control variables has been appropriately specified.

Table 5: shows the correlation of control variables and trade flows in order to avoid the use of exogenous regressors in poisson pseudo maximum likelihood gravity model estimates.

	Trade	L o g _ GDP	L o g _ area	L o g _ dis	rta	l a n d - locked	Border	Com _ lang	CU
Trade	1.0000	0.7104	0.0348	-0.2135	0.0967	-0.1575	0.1708	0.0150	0.0020
L o g _ GDP	0.7104	1.0000	0.5208	-0.0913	0.0139	0.2521	0.1900	0.0041	0.0010
L o g _ area	0.0348	0.5208	1.0000	0.1800	0.1522	-0.3803	0.3412	-0.0563	0.0097
Log_dis	-0.2135	-0.0913	0.1800	1.0000	-0.2163	0.0314	0.0000	-0.3208	-0.0204

rta	0.0967	0.0139	0.1522	-0.2163	1.0000	0.1417	0.2598	0.0037	0.3217
land-locked	-0.1575	0.2521	-0.3803	0.0314	0.1417	1.0000	0.1100	0.0500	0.0411
Border	0.1708	0.1900	0.3412	0.0000	0.2598	0.1100	1.0000	0.5161	0.4708
Com_lang	0.0150	0.0041	-0.0563	-0.3208	0.0037	0.0500	0.5161	1.0000	-0.0430
CU	0.0020	0.0010	0.0097	-0.0204	0.3217	0.0411	0.4708	-0.0430	1.0000

The above table's results shows that the relationship between trade and other geographic regressors is weak and negligible. The nuisance factors are uncorrelated with common currency variable's coefficient expect for the regional trade agreement regressor which has a correlation bigger than 30 percent. We assume that this higher relationship between RTA and currency union is random, since they both have a high relationship with other so-called control variables.

The first regression model output in Table 6. Shows the impact of exchange rate and other regressors on the total value of trade flows in USD current prices. This table present this impact within 2 different periods; The first period is between 1997-2007 (before the introduction of Rwanda within EAC) while the second period is between 2008-2017 (After the introduction of Rwanda within EAC).

Table 6: impact of exchange rate volatility on trade flows before and after introduction of Rwanda to EAC

	Period 1997-2007				Period 2008-2017			
	Estimates	Std.error	t-value	p(>t)	Estimates	Std.error	t-value	p(>t)
intercepts	-0.57	0.39	-1.46	0.15	-0.21	0.33	-1.39	0.14
Log_GDP	0.08	0.02	3.81	0.00	0.08	0.02	3.82	0.00
Log_area	0.00	0.02	-0.12	0.90	0.00	0.02	-0.12	0.90
Log_dis	-0.12	0.00	-1.57	0.12	0.03	0.00	-1.57	0.12
rta	0.25	0.03	7.90	0.00	0.26	0.02	7.89	0.00
landlocked	0.00	0.03	0.00	1.00	0.00	0.03	0.00	1.00
Border	0.01	0.02	-1.77	0.04	0.01	0.00	-1.76	0.04
Com_lang	0.01	0.09	4.59	0.00	0.08	0.02	3.82	0.00
Exchange_rate	-0.03	0.03	1.04	0.00	-0.02	0.05	2.46	0.01

Results as shown in Table 6. shows interestingly, that the introduction of Rwanda in EAC, have impacted a lot trade through the increase in contribution of other sectors to bilateral trade among EAC country members. when testing the impact of Monetary union, in the model without the common currency, we include Importer and export real exchange rate to have control on the exchange rate. Importer and export real exchange rate are both in local currency units per USD.

Results before the integration of Rwanda shows that for the exchange rate volatility, 1% increase in average buying-selling exchange rate decline trade flows by 3.34% among trading countries while after the integration while after the integration the exchange rate volatility 1% increase in average buying-selling exchange rate decline trade flows by 1.78%. The other factor affected by regional integration is the distance regressor which is used as proxy for trade cost; before integration to EAC the increases by 1 percent in distance between Rwanda and other country declines trade bilateral trade by 11.7 percent while after integration the increases by 1 percent in distance between Rwanda and other country declines trade bilateral trade by 2.64 percent.

For the parameter estimates, income variable (GDP) an increase in 1% importer or exporter's income results in an increase of 7.55% in trade flows before and increase of 7.95% in trade flows after Rwanda introduction to EAC. These results coincide approximately with the reality as Since 2010 all partner countries in EAC has shown an increase in their overall GDP of 2% which resulted in the overall average growth in trade flows of 13.2% among trading partners.

Rather the distance appears to be somewhat less important to effect the bilateral trade flows, this is due to the regional trade agreement and custom union which reduces its impact on bilateral trade among trading partners. and the If the distance between country i and j increases by 1 percent, average bilateral trade between trading countries will decline by 2.64% percent (holding all other things constant) since 2008. Comparing countries having common borders to countries without common borders, results showed that countries having common borders 3.96% percent higher trade between them compared to countries without common borders.

In the second hand results shows that if the countries have common official language with Rwanda, trade between them with Rwanda will be 38 percent higher than countries without common language. Finally country with regional trade agreement are likely to increase trade by 24% higher than country without trade agreements. This study mainly focus on the impact that monetary union policy set-up can have on trading among EAC country members. This is why we first check the impact of exchange rate fluctuations on trade flows among EAC countries members. Results shows that exchange rate has a negative impact on bilateral trade, 1% increase in average buying-selling exchange rate decline trade flows by 1.34% among trading countries.

	Currency union (CU=1)				Currency union (CU=0)			
	Estimates	Std.error	t-value	p(>t)	Estimates	Std.error	t-value	p(>t)
intercepts	-0.672	0.381	-1.765	0.079	-0.794	0.259	-1.887	-0.043
Log_GDP	0.081	0.019	4.223	0.000	0.072	0.010	5.214	0.009
Log_area	0.010	0.054	-3.026	0.018	0.009	0.023	-2.416	0.018
Log_dis	-0.035	0.006	-5.836	0.027	-4.196	0.005	-4.764	0.025
rta	0.150	0.000	-5.418	0.016	0.102	0.001	-3.765	0.023
landlocked	-0.018	0.018	6.086	0.000	-0.014	-0.046	3.754	0.009
Border	0.000	0.030	0.000	1.000	0.000	0.014	0.000	1.000
Com_lang	0.021	0.028	4.034	0.000	0.002	0.010	5.214	0.009
Exchange_rate	0.016	0.002	-2.666	0.018	0.000	0.000	0.000	0.000

The signs of coefficients of regressors correspond to the expectations of this study and are all significant at 95% confidence interval. According to the sample estimates, findings shows that, assuming that exchange rate effect is a 1% increase fixed GDP of Rwanda or other EAC's country member, increase trade flows with 8.1%. On the other hand both area of both importer and exporter shows to have a small impact on bilateral trade between trading partners. The regional trade agreement shows to have a big impact on trade when there is no exchange rate fluctuation effects, where it affect trade with 13% increase. Rwanda being landlocked, contribute to a 0.87 percent decline in trade flows within the region.

Finally this study assess the impact moneatry union can have on trade flows among eac county members if adopted by country members. Findings shows that without exchange rate fluctuation risk and assuming the monetary union from 3 years back (since 2014), results shows that trade flows

would have increase by 4.10% by now. The setup of currency union is expected to be stronger since the currency union partner is one with whom Rwanda has a high trades volume. Findings shows that regressors act interdependently such that the the change in one sector could induce growth.

Some trading frictions are reduced by a currency union adoption. Findings shows that monetary union does not boost only trade but increases also the contribution of other regressors to trade flows. Where the adoption of single currency increase the contribution of income from 7.2 to 8.7 percent, negative impact of distance is declined from 3.4 percent to 2.7 percent, the area product (used as proxy of market size) is increased from 0.92 to 0.98 percent. Even though Landlocked dummy variable give weird output, Landlocked dummy variable's friction to trade is increased by currency union from -1.3 to -1.7 percent.

5. Conclusion and policy recommendations

The main purpose of this study is to assess feasibility of EAMU and the impact that EAMU adoption within east African country members can have on Rwanda's bilateral trade flows, focusing on the effect of a common currency resulting from the neutralization of exchange rate volatility resulting from transaction costs and credibility.

The first section of results shows the divergence of members in their inflation rate, which can hinder the success of east African monetary union. This means that EAC countries still need time to converge in terms of inflation pressure, since the correlation coefficient of the four countries, namely Uganda, Tanzania, Kenya, Rwanda and Burundi except Rwanda that has shown a stable inflation rate. However, the overall results also suggest that there has been a considerable convergence in the size of financial intermediary sectors for most of the EAC countries, which gives hope to the possibility of a well functioning of the envisaged east African monetary union. The big challenge is still in the real GDP of countries which illustrate that Burundi do not shows a fair degree of convergence, especially Burundi with a poor growth still time for convergence and it is difficult to be achieve by 2024.

The finding that the monetary union should increase Rwandan trade flows with EAC members is verified using econometric analysis where the Poisson pseudo maximum likelihood gravity model is used, we analyze the consequences of the Rwandan benefit to the introduction of a single currency with EAC country members on its trade flows. The study emphasized that the evaluation of monetary union policy's effect on trade in this region using gravity model is merely an econometric exercise, one without explicit theoretical foundation. Even though Income and distance have high weight in this model, we includes other economic factors such as free trade agreement, common colonizer, common borders, Area and Language have paid less attention to the estimates for language.

First we test the impact of exchange rate volatility and other economic factors on trade flows we found that the exchange rate affect negatively trading within the region, where 1 percent increase in average buying-selling exchange rate decline trade flows by 1.34 percent among trading countries and that the gross domestic product and regional trade agreement are the most affecting factors influencing trade flows. Most of economists consider single currency as an irrevocable fixed exchange rate regime, however many empirical studies lead to a conclusion is that that these fluctuations seem to influence foreign trade very little estimating a small or even a zero effect. This conclusion can be considered as fairly robust as the various studies have been done using different methods and found the same results. This implies that the traditional effect of eliminating exchange rate uncertainty should be addressed separately from the effect of monetary union on trade.

Finally, the study assess the impact monetary union can have on trade flows among EAC county members if adopted by country members. Assuming the monetary union from 3 years back (since 2014) findings shows that without exchange rate fluctuation risk trade flows can increase by 4.10% considering that the transaction costs of the currency switch and hedging in futures markets are low. The results we expected, was that the EAC currency union will have a very big different effects on its members' exports and imports compared with other studies on the impact of monetary union to countries' trade. We observation through estimated results that the setup of monetary union policy will influence with a little amount on the contribution of other economic factors to trade flows, we think that the reason for this underestimation is because the currency union is between few countries.

The other observation is that the elimination of transaction costs in a single currency will lead to market adjustments in all the sectors of the Rwandan economy. The study estimate that the setup of single currency can increase the contribution of Rwanda GDP to bilateral trade from 7.55 to 8.01 percent and other economic factors.

This study found to underestimate some of regressor's coefficients, Compared to similar previous studies. This study estimate a negative impact of Distance (proxy for freight and transportation cost) of 0.22 percent, while we expected to be bigger than 2 percent according to similar study. This study findings seems underestimate regressor's coefficients the negative contribution of landlocked dummy as well as border dummy variable (effect of neighboring) on trade comparing to other similar studies. In this study, bordering regions exhibited negligible effects (approximately zero) effect on trade consistently with border effects being significant. This observation need further checking and more related studies to explain the reason for this difference in estimates.

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Rwanda in Africa continental free trade area: challenges-opportunities analysis

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Abstract

This study on “Rwanda in Africa Continental Free Trade Area (AfCFTA): Challenges-Opportunities Analysis” aimed at assessing the challenges-opportunities from Rwanda industrialization, labor productivity and competitiveness, then finding out the required policy actions to allow Rwanda competing profitably in AfCFTA. To achieve these objectives, the researchers applied scientifically recognized techniques such as documentary, unstructured interviews with professionals from MINICOM, PSF, NISR and MINECOFIN and methods like historical and comparative methods.

As detailed in the document and summarized in the conclusion, the findings revealed that Rwanda has opportunities like of having strong institutions and leadership, stable macroeconomic situation, favorable investment environment, strong health care system, etc and challenges such as high transport cost for both imported finished goods and raw materials as landlocked country (1,416 kilometers from the Indian Ocean and 1,250Km from the Atlantic Ocean), industries with insufficient and low quality raw materials; insufficient and inadequate energy; high production cost, low human development index (0.524, 158th out of 189 countries: UNDP, 2018), lack of needed specializations and skills for industrial development, etc for them the study is proposed the following policy actions:

1. To mitigate risks from being landlocked country, initiating, promoting and maintaining the regional economic communities spirit like EAC, COMESA and AfCFTA, is a sine qua non condition for industrial and trade development in Rwanda.
2. To Reduce 20% from the today's recurrent budget rate averaged at 51% (2009-2018), taking 5% each year for 4 years in favor of the required basic infrastructure, in subsidizing among other raw materials, transport costs, strengthen the products certification system in RSB, etc
3. Apply progressively the Big Push or Unbalanced Growth theories of prioritizing the more impactful sector
4. To Continue promoting both universal and specialized education, reinforcing social programs to improve the Human Capital Development, source of high productive capacity and productivity.

The presented research contributed a lot in identifying both challenges and opportunities in industrialization, labor productivity and competitiveness, as key engines for the industrial and trade development. Based on the findings, the study proposed some needed sacrifices to allow Rwanda compete successfully in AfCFTA.

Key words: Industrialization, Labor Productivity, Competitiveness, AfCFTA

1. General Introduction

1.1. Introduction

On March 21st 2018, in Kigali, African Union member states approved the agreement of creating a single continental market for goods and services, with free movement of business people and investments named in short AfCFTA or Africa Continental Free Trade Area. This agreement will enter in force after having 22 ratifications. Up to February 2019, only 3 ratifications are remaining. Soon, the agreement is going to be implemented.

Based on the above, this research topic aims at analyzing the challenges-opportunities from industrialization, labor and competitiveness in Rwanda as key engines for the required industrial and trade development to gainfully compete in AfCFTA.

The agreement which was adopted in Ethiopia on January 2012 is of big importance for African countries as huge market of about 1.2 billion people with a combined GDP of between \$2.2 trillion (Andrew Mold, 2018) and US\$3.4 trillion (18th Ordinary Session of the Assembly of Heads of State and Government of the African Union, in Addis Ababa, Ethiopia 2012).

However, the above AU intentions of having a common market will be achieved only if African continent promotes concurrently industrialization, labor productivity and competitiveness which are currently at lower level compare to the rest of the world. This is based on that majority of these countries, including Rwanda, export almost all their raw materials unprocessed at low prices and import the finished goods at high process as these prices are determined by WTO "World Trade Organization" under fully control of the buyers. Ivory Coast and Ghana can serve as examples as reported by Lawrence Mbae (March 2014) from UNCTAD 2013 report. Although they produce 53% of the world's cocoa, they are still importing more chocolate. The same for Nigeria which cannot refine enough fuel for domestic markets while it is the 6th largest producer of the crude oil from it more than 80% is exported unprocessed. Rwanda cannot be exempted from these cases; especially on exported café and imported Nescafé although data cannot be easily found.

These scenarios would be behind the critical level of industrialization in African countries estimated between 1% and 3% of global manufacturing (Laurence, 2014 and Marimba Tafirenyika, 2016). According to the Competitive Industrial Performance Index report of 2016, industrialization level of Rwanda is low. According to the same report, Rwanda is ranked the 136th with score of 0.003 versus world's average score of 0.079 in 2014 and 141st with score of 0.002 versus world's average score of 0.072 in 2016.

The same situation of critical industrialization level in Africa and Rwanda in particular is replicated to the both labor productivity and competitiveness where they are also low. As extracted by ILO (May 2018) from World Labor Productivity report, Rwanda Labor Productivity in comparison with the other African Lower and Upper Income Countries is not competitive. Although Rwanda Labor Productivity is growing during the period of 2000 to 2020, it is still not competitive. As example, Labor productivity was US \$1,626/worker in 2000 against US \$ 12,678/worker and US \$42,863/worker for respectively Lower Income Countries and Upper Income Countries. The same in 2015 where this share was US \$3,394 against US \$ 18,793 and US \$44,939 for respectively lower and Upper Income Countries. This scenario is the same for the competitiveness where Rwanda is overall scored at 57% which is low score compare

to other countries. Rwanda is more competitive in enabling environment, side of institution setting with 64% but weak in ICT adoption with 27%, Innovation ecosystem, side of innovation capability with 27%, market size with 34% and human capital, skills side with 41% (World Economic Forum, Global Competitiveness Index report 2018).

Another challenge to African countries is a chronic trade deficit where majority of them import more than they export due mainly to trade arrangements with developed countries, weak industrialization, low labor productivity and competitiveness among others. Rwanda, as reported by BNR (2019, February), recorded trade deficit of US \$1,665.9 million in 2015; US \$1,522.5 million in 2016; US \$1,196.7 million in 2017 and US \$1,324.3 million in 2018. The AfCFTA has been thought to progressively resolve these issues.

As reported by Ministry of Trade and Industry, MINICOM (July, 2018), Rwanda and many other African countries, are still with large trade deficits which hinder both economic growth and development despite having been granted preferential markets such as EU, AGOA, China, India and Korea. They have also regional economic communities like COMESA, EAC, TFTA (SADC- EAC- COMESA), ECCAS and CEPGL. The AfCFTA has been thought to resolve such problems of low level of industrialization, labor productivity and competitiveness leading to the high and chronic trade deficits.

It is in this context the AfCFTA success will depend to the success of individual country like Rwanda. To succeed, Rwanda should play a considerable role by both buying and selling in Africa. To reach this level, Rwanda should be competitive in industrialization, labor productivity and competitiveness.

So, after assessing the status of challenges-opportunities from industrialization, labor productivity and competitiveness in Rwanda, this study intends to find out the needed policy actions to allow Rwanda competing advantageously in AfCFTA.

Specifically, the research topic aims:

1. To conduct a challenges-opportunities analysis of industrialization, labor productivity and competitiveness in Rwanda
2. To find out the needed policy actions to allow Rwanda competing successfully in AfCFTA

Research questions are as follows:

1. How are the challenges-opportunities from the industrialization, labor productivity and competitiveness in Rwanda?
2. What are the required policy actions to allow Rwanda competing gainfully in AfCFTA?

1.2. Reasons behind selecting Industrialization, labor productivity and competitiveness

In analyzing the requirement for Rwanda to compete in AfCFTA, the industrialization, labor productivity and competitiveness sectors have been selected as key factors contributing to the trade development, source of competing advantageously in AfCFTA.

- **Industrialization**

With promoted industrialization, the quality and quantity of manufacturing industries increase and consequently the growth of the sector. This allows the generation of jobs, the increase of wages or income, both at the individual and country level, increase of the production of goods and services, exports and revenues, increase of taxes to government, etc. As the industrial sector expands, its production increases and cost of production decreases as consequently the quality of products improved due to technology. Industrialization increases the supply of goods for internal and external markets. The increase of production due to expansion of industrial sector, leads to increase of supply both at domestic and foreign markets, source of good international trade.

- **Labor Productivity**

A country having high labor productivity produces more than another both using the same amount of time or inputs. With improved or increased labor productivity, Rwanda can produce more to be traded

in AfCFTA to avoid continue being net importer, source of chronic trade deficit. To have satisfactory level of labor productivity for a country, human capital development (HCD), technologies change and economies of scale, commonly known as determinants of labor productivity, should be at high level. The HCD is constituted by the cumulated knowledge from education and experience, skills, and expertise that the average worker in an economy should have while the technologies change is combination of invention (advances in knowledge) and innovation. The economies of scale are the cost advantages that industries obtain from the size of production. Rwanda should have high labor productivity level in order to gainfully trade in the big market like AfCFTA.

- Competitiveness

A country or company is said competitive when it offers at both local and international markets quality products and services, at competitive prices. These goods and services should provide sufficient returns on the utilized resources. In the analysis of the ability of Rwanda to profitably trade in AfCFTA, the competitiveness has been selected as a key factor which can show the level of Rwanda in competitiveness.

2. Literature Review

After providing the literature review on industrialization, labor productivity and competitiveness under 2.1, 2.2 and 2.3 respectively, this part provides also the clarifications on historical background of AfCFTA, objectives and requirements, lessons learnt from RECs and implications of AfCFTA on Inter Africa Trade and the rest of the World under 2.4, 2.5 and 2.6 respectively.

2.1. Literature Review on Industrialization

Industrialization is defined as development of industries. It is a process by which an economy is transformed from primary sector to the based manufacturing sector. The manual system is replaced by mechanized mass production system.

Matthew DiLallo (May 26, 2015), defines industrialization as a process whereby individual labor is replaced by mechanized mass production and specialized laborers, which boosts productivity. It is the large-scale introduction of manufacturing into a country. It shifts an underdeveloped agricultural economy focused on human labor to an industrial economy based on machine labor.

Industrialization can't be disassociated with industrial revolution as the former couldn't happen without the latter. Eric Hobsbawm (1962) and T. S. Ashton (1997), define industrial revolution as process of going from hand production system to the machines system; changing from an agrarian and handicraft economy to the economy dominated by industry and machine manufacturing.

The first industrial revolution dated from approximately 1760 to 1840 in British and developed over a number of decades (1852–1883) before being spread to other Western European societies and other parts of the World but its précised start and end period is still debated among historians. For Eric H. (1962), the industrial revolution began in Great Britain in the 1780s and was not fully felt until the 1830s or 1840s while T.S. Ashton (1997) says that it occurred roughly between 1760 and 1830. Others (Google. Com) say that it started in 17th century: "The English revolutions of the 17th century had fostered a spirit of economic prosperity". That would be one of the reasons majority of literatures prefer saying that it started in mid-18th century and ended in 19th century.

The term "Industrial Revolution" was first used and popularized in the period of 1852–83 by Arnold Joseph Toynbee (April 14th -October 22nd 1975), the English Economic Historian, and Philosopher of history where he described the development of Britain's economy of from 1760 to 1840. The industrial revolution in British led to a rapid increase in the division of labor, both between individuals and occupational groups and also between industrialized and no industrialized nations, changes which led to a transformation of the techniques and the social organization of agriculture as well as of extractive and manufacturing industry, with high rates of growth in steam power and iron production occurring after 1800. Mechanized textile production spread from Great Britain to Europe and the United States in the early 19th century, with important centers of textiles, iron and coal emerging in Belgium and the United States and later textiles in France.

African continent has also been affected by the British or in general European industrial revolution. In 19th and early 20th centuries through imperialism where European countries colonized African countries to get economic power through it they bought from Africa countries raw materials at cheaper prices and sold to them finished goods at higher prices. These prices are generally determined by WTO "World Trade Organization" under fully control of rich countries. This kind of trade didn't allow Africa thinking about its industrialization. This would be one of the reasons Africa is still weak in industrialization.

As quoted by Laurence (2014) from 2013 UN Conference on Trade and Development, African countries account for only 1% of global manufacturing. For Marimba Tafirenyika (2016) from the Economist Intelligence Unit, a British business research group, Africa accounted around 3% of global manufacturing output in the 1970s and the rate is likely to remain small throughout the rest of the decades.

In front of this situation, African countries Leaders, during campaigns, use to promise to promote industrialization to bring prosperity, new jobs and better incomes for all. Unfortunately, the continent is still less industrialized today than it was four decades ago. In fact, according to the UN Economic Commission for Africa (ECA), the contribution of Africa's manufacturing sector to the continent's gross domestic product actually declined from 12% in 1980 to 11% in 2013, where it has remained stagnant over the past few years.

Exporting unprocessed raw materials would be behind this weakness. As example, capitals of Ivory Coast and Ghana are loaded with chocolates imported from Switzerland and UK, while these countries produce more than half of the world's cocoa (53%). This situation is repeated throughout the continent in different contexts. For example, as the world's 6th largest producer of crude oil, Nigeria exports more than 80% of its oil but cannot refine enough for domestic market. It spent in 2013 about \$6 billion of subsidy on fuel importation. Without strong industries to create jobs and add value to raw materials, African countries risk remaining secured by joblessness and poverty while the content has considerable non value-added resources.

For example, according to the UN Conference on Trade and Development (UNCTAD) 2013 report as quoted by Lawrence Mbae (March 2014), the continent possesses 12% of the world's oil reserves, 40% of its gold and between 80% and 90% of its chromium and platinum, 60% of the world's underutilized arable land and timber resources, etc.

As highlighted by Marimba Tafirenyika (2016), increasing recurrent budget or nonproductive budget than productive budget would be another reason behind this low level of industrialization. Ghana and Zambia are given as examples here: "Instead of using the windfall to set up or stimulate manufacturing industries, African countries—with a few exceptions—wasted the money on non-productive expenditures. Ghana and Zambia, for instance, used profits from the commodity bonanza to solve short-term domestic problems, such as by increasing salaries for civil servants."

In Rwanda, although industry sector is quite competitive, it is also weak as other African countries. It is composed by 4752 firms of which 97% are manufacturing, 2% construction and 1% mining and quarrying firms. Majority of them or 70% are located in Kigali with little number in Kigali outside centers. The processed products are wood, tobacco, cement, textiles, agricultural products, small scale beverages, soap, furniture, shoes, plastic goods, tea and coffee, etc. Others include chemicals, construction, printing, paper, engineering and methane gas. The key challenges to the industrial sector includes inadequacy energy, insufficient raw materials, etc

All the above stated dismal situation of trade between rich countries and African countries creates a cycle of perpetual dependency, leaving African countries reliant on the export of raw products and exposed to various exogenous shocks.

2.2. Literature Review on Labor Productivity

Labor productivity or workforce productivity is an economic output per labor hour. It is equal to the total output or GDP over total labor hours. Labor productivity should not be confused with employee's productivity, which is a measure of an individual worker's output.

Contrary to the Rwanda which calculates the labor productivity by dividing GDP by total labor force, the labor productivity is internationally measured by hour which equals to the total GDP over total labor hours during a given year. As example, assume a country's total output for 2017 was \$ 25 billion. Total productive hours for the year for all work force are 100 million. Labor productivity is equal to: \$ 25 billion/ 100 million hours = \$ 250 per labor hour.

In Rwanda, the Labor Productivity is calculated using total number of work force as denominator not total hours. As example using figures provided by Rugwabiza Minenga Leonard (MINECOFIN, 2018), for the year 2014 in Rwanda, the GDP for agriculture, fishing and forest was RwF 1,572 billion with total labor force of 3,704 thousand. The calculated labor productivity was 0.4 million per labor force calculated as follows: RwF 1,572 billion /3,704 thousand.

In their research, Li and Tian (1999) concluded that labor productivity growth was the result of technological progress and capital deepening. Others researchers attribute the growth in labor productivity to the variations in physical capital, human capital and new technology. If labor productivity is growing, it can be traced back to the growth in one of these three components. The physical capital includes savings and investments while Human capital represents the increase in education and specialization. The positive change in labor productivity is due to employees engaged in training, by installing new production and service techniques, introducing automation, and similar measures. As a workforce gains in experience, its labor productivity will generally increase. Conversely, as more experienced people are replaced by new ones, the productivity level tends to fall. Thus, employee turnover can have a pronounced negative effect on labor productivity. The worker's skill level in each sector is defined as the range of capital goods that each individual has learnt to use. Thus, when worker of a particular sector receive training and learn to use new machines, economic growth in that sector is enhanced.

Tu and Xiao (2006) further decomposed industrial labor productivity growth into three parts: pure technological progress, technological efficiency and capital deepening. In their research, they found that the contribution of capital deepening was up to 81%, but its effect was descending. To explore the effect of capital deepening on labor productivity growth, Huang and Liu (2006) decomposed capital into building capital and equipment capital. The result showed that capital deepening played a pivotal role in labor productivity and economic growth. Cheng and Chen (2005), Wei (2007) analyzed the effect of increasing returns to scale on manufacturing labor productivity growth.

By sorting out past literatures, majority of economists fully affirm the role of capital deepening in labor productivity growth, but they don't show clearly the sources of capital deepening. According to neo-classical economic theory, wage growth will promote labor productivity growth through capital deepening. Hicks (1932) argued that wages growth will encourage enterprises to use more capital to replace labor in the production process, which will promote resources allocation and labor productivity growth. The specific mechanism can be interpreted as follows: static sense, wage growth will change the marginal technical substitution rate of the production function; dynamic sense, wage growth will induce unbiased technological innovation, that is, enterprises will use more capital to substitute labor (Kennedy, 1964; Samuelson, 1965; Acemoglu, 2003).

2.3. Literature Review on Competitiveness

World Economic Forum defines competitiveness as the "set of institutions, policies and factors that determine the level of productivity of a country". This is a good indicator as the prosperity rises when competitiveness increases. Countries are named competitive when they are most likely to be able to grow more sustainably and inclusively. This means that there is likelihood that everyone in the country will benefit from the fruits of economic growth. The productivity in this is very important as the main factor driving growth and income levels because the more income levels increase the more human welfare is improved. So understanding the factors that allow for this chain of events to occur is very important.

To produce the competitiveness index which shows the level of every country in terms of competitiveness, the World Economic Forum uses 12 distinct points grouped into following 3 sub-indexes named basic requirements: institutions, infrastructure, macroeconomic environment and health and primary education. The evaluator looks also at the efficiency enhancers, specifically how market of goods and services works; that of labor and financial, how is the higher education and training, technological

readiness, knowledge-based economies, etc. The high competitive country should be productive with high level of productivity leading to the high level of income and growth, source of well-being of the people and hopefulness or confidence of having perpetual live. The evaluator of the competitiveness of countries cannot leave without analyzing the business sophistication and innovation in a country. These are more complex areas of competitiveness that require an economy to be on the world-class businesses and research establishment's level, as well as an innovative, supportive government. Countries responding positively to all above required standards, are among advanced economies with high GDP capita.

2.4. Historical background of AfCFTA, Objectives and requirements

As highlighted by Jennifer Okpata (Nov. 2018), the first idea of creating AfCFTA was adopted in the 18th Ordinary AU General Assembly, held in Addis Ababa, Ethiopia in January 2012. The free trade area is to include all fifty-four (54) African countries with a population of more than one billion people and a combined GDP of more than US \$3.4 trillion. June 2015, at the 25th summit of the AU held in South Africa, negotiations towards the establishment of AfCFTA were launched.

The idea was based on the fact that the lack of intra-African Trade is one the facts that many African countries are poor and can hardly produce anything their neighboring countries might want to trade. Additionally, the historical effect of Africa's geography, with specific reference to River Niger, makes it difficult for countries within the River Niger area to flow their goods within the continent.

These factors put intra-African trade at about 18% which is relatively below average in comparison with intra-Asian trade which is about 59% and 69% of intra-Europe trade while about 82% of exports by African countries are exported to other continents of the World than Africa.

The major aim of AfCFTA is to create a single continental market for goods and services, which will ensure free movement of business persons and investments, as well as create an avenue for the establishment of the continental and the African Custom Union. It is a market access mechanism which is expected to deliver many benefits to the African Countries.

AfCFTA will enhance intra-African trade through trade liberalization. The Action plan on Boosting Intra-African Trade (BIAT) has identified seven priority action clusters namely: trade policy, trade facilitation, and procedure capacity, trade related infrastructure, trade finance, trade information and factor market integration. It will lead to a much larger market which will improve competitiveness and encourage manufacturing within the African Borders and also improve the standard of manufactured goods.

The emergence of AfCFTA will bring about a boost in trade, welfare gains, foster a vibrant and resilient African economic space, and promote economic diversification, structural transformation, technological development and enhancement of human capital. Furthermore, it will also go a long way in fostering peace, security and also political stability in Africa.

AfCFTA will also serve as a measure to resolve challenges arising from multiple and overlapping memberships and accelerate a regional and continental integration process. The promotion of AfCFTA will be fundamental for sustainable industrial development, diversification, employment creation and poverty eradication.

2.5. Lessons learnt from RECs “Regional Economic Communities”

As highlighted in the MINICOM presentation given by the Permanent Secretary, Michel Sebera (Kigali, July 2018), the RECs are actually composed by COMESA, EAC, SADEC and ECCAS as detailed in the below table:

SN	REC	Join in	GDP (in billion USD)	Population (in million)
1	COMESA	2004	550	390
2	EAC	2007	110	143

3	SADEC		540	67
4	ECCAS	Re-Joined 2015	170	121
	Total		1,370	721

Source: retreated by the Researchers based on MINICOM presentation

Though the aim of these alliance was at reducing barriers to trade and investment, majority of African countries or even all didn't significantly gain from these RCEs. Rwanda can serve as example. Even though Rwanda is member of all these RECs with it total 721 million of population and US \$ 1.37 trillion of GDP, the lessons learnt is that Rwanda is still among poor countries, net importer as its trade balance is negative over the years. The main contributor to this unfavorable situation to Rwanda is due mainly to weak level of Rwanda industrialization, labor productivity and competitiveness which are at lower level compare to other African countries.

2.6. Implications of AfCFTA on Inter Africa Trade and the rest of the World

As noted by MINICOM, the AfCFTA's objective is to double the share of Intra-African Trade within the next 10 years (from 10-12% to 20-25%).

According to UNECA quoted by Jennifer Okpata (Nov. 2018), the AfCFTA can increase intra-African trade by \$35 billion (52%) per year by 2022. Imports from outside of the continent would decrease by \$10 billion per year, and agricultural and industrial exports are expected to increase by \$4 billion (7%) and \$21 billion (5%) respectively.

In details, the expected benefits from the establishment of AfCFTA are as follows:

1. Africans are drawn together and automatically remove the boundaries that separate them
2. Trading costs or transaction costs to business will be lowered, regional resources combined, gain from economies of scale in production, more efficient allocation of resources, etc.
3. African countries' industries will work effectively due to overcoming the constraint of small economic size as mmajority of 54 African countries are small both in mass size and income levels, while 15 are land-locked.
4. AfCFTA will help in attracting foreign investment and technology, motivated by economies of scale.
5. The rest of the World will be motivated of investing in AfCFTA to gain from economies of scale but also will lose the market as imports from them will be reduced. The political issues will be more raised to separate again Africa continent. So, African Countries should be strong, seriously committed to this AfCFTA project.

3. Research methodology

To achieve the above research objectives, the researchers applied the documentary techniques by exploiting its topic related documentation to get and provide meaning of the used concepts and all concepts related literature, know the level of Rwanda in industrialization, labor productivity and competitiveness in comparison with other countries; find out the reasons behind the industrialization, labor productivity and competitiveness levels or status in order to propose what to do for Rwanda to play its role in AfCFTA "Africa Continental Free Trade Area/Agreement".

Among of consulted documentation, there are: Documentation related to AfCFTA, World Economic Forum, ILO, Penn World Table (PWT), etc reports on Rwanda industrialization, Labor Productivity, Competitiveness, electronic resources for Rwanda Trade Deficit, etc. Unstructured interviews with professionals from MINICOM, PSF, NISR and MINECOFIN to get data and views on some points has also been used.

For treating the above collected data to have this final report, the researchers applied also some research methods as statistical method, historical method, analytical method, synthetic method, etc.

4. Research Findings

The expected findings of this study are on the level of Rwanda in Industrialization, Labor Productivity and Competitiveness; factors hindering their development and proposed policy actions.

4.1. Findings on Rwanda Industrialization

The present section makes analysis of challenges-opportunities of industrialization in Rwanda associated with required policy actions to advantageously compete in AfCFTA.

4.1.1. Challenges-Opportunities Analysis of industrialization in Rwanda

Based on the below Competitive Industrial Performance Index as produced by UNIDO (Vienna, 2017), industrialization in Rwanda is still with challenges. According to this UNIDO's report, Rwanda is ranked the 136th with score of 0.003 versus world's average score of 0.079 in 2014 and 141st with score of 0.002 versus world's average score of 0.072 in 2016. This competitive industrial performance index is the results from two following sub components: Manufacturing Industrial Value Added Indexes (Manufacturing Value Added per Capital Index, Share of Manufacturing Value Added in GDP Index, Share of Medium and High-Tech Activities in total Manufacturing Value-Added, Industrialization Intensity Index, Share of World Manufacturing Value Added Index) and Manufacturing Export Indexes (Manufacturing Export per Capita Index, share of Manufacturing Exports In Total Exports, Share of Medium and High-Tech Activities in Total and Manufacturing Export, Index Industrial Export Quality Index, Share in world Manufacturing Export Index), all ranked as detailed in the below table.

Competitive Industrial Performance Index (Rwanda)						
Manufacturing Sector Summary (export data are in current USD, all other values- in constant 2010 US dol-lars)						
2014		2016				
GDP: 7,419 million / 613 per capita		8,482 million / 712 per capita				
Manufacturing value added: 374.4 mil-lion / 30.9 per Capita		421.5 million / 35.4 per capita				
Manufacturing exports: 291.6 million / 24.1 per Capita		152.7 million / 12.8 per capita				
Performance indexes		2014			2016	
	Rank	Score	World_Aver-age	Rank	Score	World_Average
Competitive Industrial Perfor-mance Index	136	0.003	0.079	141	0.002	0.072
Manufacturing Value Added Indexes						
Manufacturing Value Added per Capital Index	139	0.001	0.133	145	0.001	0.096

Share of Manufacturing Value Added in GDP Index	129	0.142	0.370	134	0.134	0.342
Share of Medium and high-Tech Activities in Total Manufacturing Value Added	125	0.080	0.308	124	0.082	0.309
Industrialization Intensity Index	135	0.111	0.339	137	0.108	0.326
Share of World Manufacturing Value Added Index	132	0.000	0.030	136	0.000	0.027
Manufacturing Export Indexes						
Manufacturing Export per Capita Index	131	0.001	0.104	142	0.000	0.103
share of Manufacturing Exports In Total Exports	80	0.658	0.627	111	0.384	0.625
Share of Medium and High-Tech Activities in Total Manufacturing Export	123	0.084	0.361	120	0.120	0.375
Index Industrial Export Quality Index	94	0.371	0.494	128	0.252	0.500
Share in world Manufacturing Export Index	127	0.000	0.041	134	0.000	0.039

Source: UNIDO, Competitive Industrial Performance report 2016 & 2018, Volume II Vienna, 2017

The above mentioned challenges faced by industrial development in Rwanda are due to the many factors such as:

- ✓ Rwanda is landlocked country: 1,416 kilometers from the Indian Ocean and 1,250Km from the Atlantic Ocean. Source of high transport cost for both imported raw materials and finished goods, leading to the high production cost, higher selling prices to the products from regional economic communities (EAC, COMESA, etc). This makes competitiveness of local products to those from
- ✓ Insufficient and quality of manufacturing raw materials for industrial development, especially for agro processing industries;
- ✓ Insufficient and inadequate energy leading to high cost of energy and cost of production;
- ✓ Insufficient and inadequate energy leading to high cost of energy,
- ✓ Low human development, especially side of industrial unskilled labor, costs which are source of higher selling prices leading to the uncompetitive versus to the imported goods which are of quality goods at lower prices.
- ✓ Etc

As seen in the below figure from the research conducted by Ministry of Trade and Industry (MINICOM, 2017), cost of raw materials is the key production cost driver with 29%, followed by cost of electricity with 17%; cost of the transport with 14% and cost of fiancé with 13%.



Despite the above highlighted challenges on the industrial development in Rwanda, the following opportunities can also support in overcoming these challenges:

- ✓ Secured and visionary country, with strong leadership, committed government, etc
- ✓ Favorable investment environment,
- ✓ Economic growth averaging 7.5% from 2007 to 2017 (NISR, EICV5, 2017),
- ✓ Private sector, natural resources and knowledge based lead economy (NST1, 2017), etc.
- ✓ Construct and develop industrial parks in provinces and expand the Kigali Special Economic Zone with capacity of 350 companies operating therein by 2024.
- ✓ Strong and committed strategy of becoming Upper Middle Income Country by 2035 with USD 4,035 per capita and Higher Income Country by 2050 with USD 12,476 per capita from today's per capita of USD 760 (NISR, EICV5, 2017).

4.1.2. Proposed Policy Actions for industrial development

1. To mitigate risks from being landlocked country, initiating, promoting and maintaining the regional economic communities spirit like EAC, COMESA and AfCFTA, is a sine qua non condition for industrial and trade development in Rwanda.
2. To get needed manufacturing raw materials for industrial development, the researchers propose the GoR to support their availability through different kinds of subsidy. To get budget for this, the today's recurrent budget rate averaged at 51% of the total budget from 2009-2018 (MINECOFIN website, Budget Management and Reporting Unit) should be reduced by 5% each year for 4 years. This as boosting industries or economic development in general, requires some sacrifices.
3. To have required electricity, there is need of evaluating all the requirements to improve the existing electrical network. Some unnecessary projects (with low return to the population from cost benefit analysis approach) should be put on hold to finance the upgrading of existing electrical network. A Paul Rodan's Big Push Model (1943), similar to the unbalanced growth theories of prioritizing the more impactful sector should be progressively applied.
4. The minimization of the production cost requires:
 - ✓ The government to subsidize transport costs for some impactful businesses like those importing more needed raw materials,
 - ✓ Improve by upgrading the electricity network and provide reliable energy at affordable prices or the same or below as the EAC "East African Communities".

- ✓ Organize a mass Human Capacity Development, especially for industrial skilled labor through WDA “Workforce Development Agency”, NEP “National Employment Program”, Capacity building in RDB “Rwanda Development Board”, etc,
- 5. Strengthen the certification system in RSB “Rwanda Standards Board” to have quality products competitive to the market.
- 6. As Rwanda is coming from far and needs to reach far by boosting among other industrialization sector, there is need of reviewing the today's applied theory “Ragnar Nurkse's Balanced Growth Theory” and apply progressively the Paul Rodan's Big Push Model or unbalanced growth of giving priorities to sectors which can boost the industrialization and economy in general.

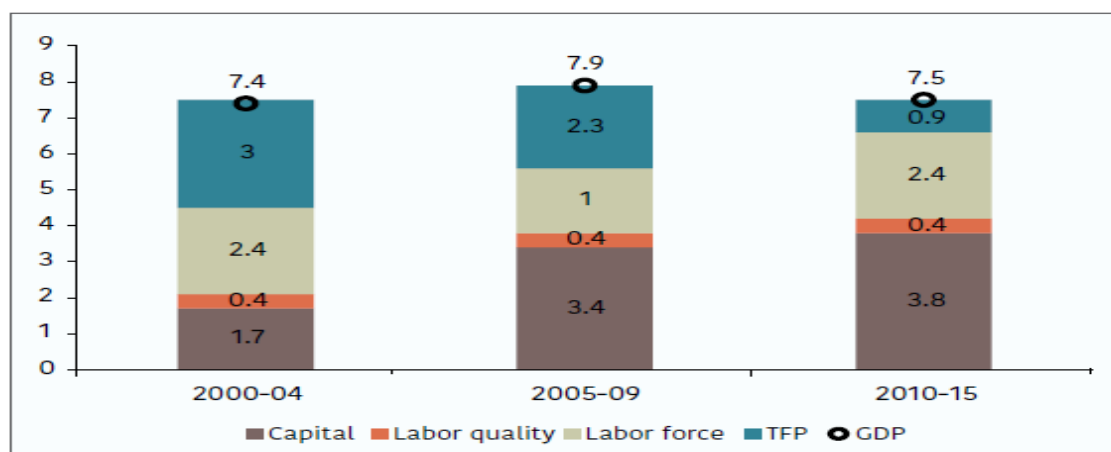
4.2. Findings on Rwanda Labor Productivity

The present section makes analysis of challenges-opportunities of Labor Productivity in Rwanda associated with required policy actions to gainfully compete in AfCFTA.

4.2.1. Challenges –Opportunities Analysis of Rwanda Total Factor Productivity

As shown in the below figure as produced by World Bank jointly with NISR, the total factor productivity is reducing from 3% in 2003-04 to 2.3% in 2005-09 and 0.9% in 2010-15. This is due mainly to the reduction of labor force from 2.4 to 1% in the period from 2000-04 to 2005-2009 and the constant of labor quality. The capital investment increased from 1.7% in 2000-04 to 3.8% in 2010-15. All these lead the reduction of contribution to GDP from 7.9 in 2005-09 to 7.5% in 2010-2015.

Figure 23: Sources of growth by factors of production, percentage points



Source: NISR, World Bank staff calculation

4.2.2. Challenges –Opportunities Analysis of Rwanda Labor Productivity by sector

Based on the below table as jointly produced by World Bank and NISR (2017) for the period of 2005 to 2014, the high labor productivity in Rwanda is in financial services with RwF 9.7 million per worker in 2014, followed by utilities with RwF 7.1. From 2004 to 2015, Mining, construction and Hotels and Restaurants, recorded a decrease in productivity of 60.26%; 18.81% and 59.19% respectively. When the labor productivity increases over time, this reflects an increase in the living standards within the country.

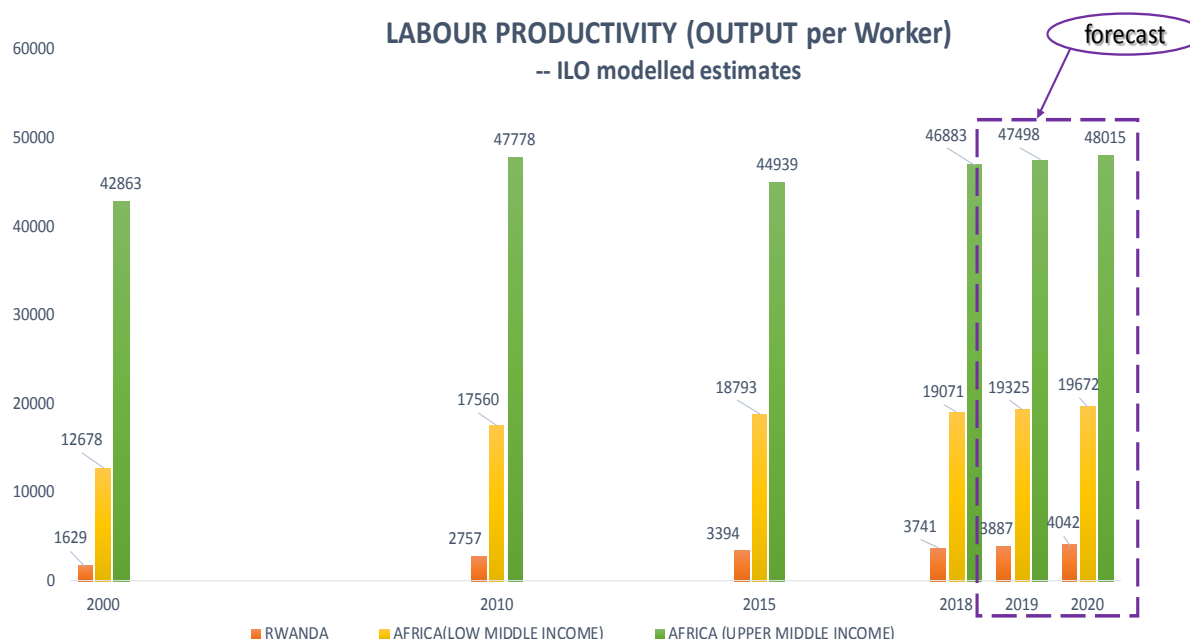
Annex table B1: labor force and productivity, 2005-2014

	labor force, thousands		GDP/value added, constant 2014 factors prices(billion Rwf)		labor productivity(mil-lion Rwf per worker)		Change in pro-ductivity
	2005	2014	2005	2014	2005	2014	2005/2014
Total val-ue added	4,488	5,479	2,579	5,089	0.6	0.9	61.65
Agricul-ture, Fish-ing, and Forestry	3,556	3,704	1,009	1,572	0.3	0.4	49.57
Mining	18	71	93	147	5.2	2.1	(60.20)
Manufac-turing	76	110	184	322	2.4	2.9	21.74
Utilities	4	11	37	78	83	71	(13.74)
Construc-tion	72	279	124	392	1.7	1.4	(18.83)
Transport, Commu-nication and ICT	58	115	99	287	1.7	2.5	46.87
Financial services	13	16	70	159	5.2	97	85.89
Hotels and Restau-rant	9	38	55	96	6.1	2.5	(59.19)
Other services	682	1,134	908	2,036	1.3	1.8	34.75

Source: NISR, World Bank staff calculation

4.2.3. Analysis of Rwanda Labor Productivity per worker versus other African countries

As observed in the below figure produced based on the ILO "International Labor Organization" report (May 2018) extracted from World Labor, from 2000 to 2018, the Rwanda labor productivity was US \$1,626/worker; US \$2,757/worker; US \$3,394/worker; and US \$ 3,741/worker, respectively in 2000; 2010; 2015 and 2018. In comparison with other African countries, it was US \$1,626/worker in 2000 against US \$ 12,678/worker and US \$42,863/worker for respectively Lower Income Countries and Upper Income Countries. Ten years after (2010), it increased up to US \$2,757/worker against US \$ 17,500/worker and US \$47,778/worker for respectively lower and Upper Income Countries. In 2015, the annual share of Rwandan worker to GDP became US \$3,394/worker against US \$ 18,793/worker and US \$44,939/worker for respectively lower and Upper Income Countries.



Source: Data treated by the Researchers from ILO report (2018 May)

As observed from the above findings on challenges-opportunities analysis, Rwanda doesn't have a competitive Labor Productivity. The total factor productivity is reducing from 3% in 2003-04 to 2.3% in 2005-09 and 0.9% in 2010-15 (NISR, WB). For the labor productivity by sector, the mining, construction and Hotels and Restaurants sectors recorded a decrease of 60.26%; 18.81% and 59.19% respectively from 2004 to 2014 (NISR, WB). The output per worker from GDP is increasing during the period of 2000 to 2018 but lower compare to African countries (ILO, 2018). This situation is attributed mainly to low HDI value of 0.524 (UNDP, 2018) with rank of 158 out of 189 countries and territories. The more HDI is low, the more is the productivity as they are closely linked.

However, the following opportunities, once effectively implemented, can positively contribute:

- ✓ The GoR, through seven-year government program or NST1 (2017) has set up a committed strategy of developing Rwandans into a capable and skilled people with quality standards of living and a stable and secure society
- ✓ Education for all program where the pre-primary net enrolment rates should increase from 17.5% (2016) to 45% by 2024 and TVET to be increased from 31.1% in (2017) to 60% by 2024 to address the challenge of mismatch in labor market demand. (NST1: 2017, p.14-15)
- ✓ VUP Program of supporting poor people through Direct Support, Public Works and Financial Services.
- ✓ WDA "Workforce Development Agency" and IPRS's programs professional courses or trainings

These strategies started producing tangible results as having annual worker's share to GDP increasing from US \$1,626 in 2000 to US \$2,757 in 2010; to US \$3,394 in 2015 and US \$ 3,741 in 2018. The Rwanda's HDI value has also been increased from 0.250 to 0.524 during the period of 1990 to 2017.

4.2.3. Required Policy Actions for the development of Labor Productivity

To overcome the above highlighted challenges and have a competitive labor productivity, researchers are proposing the following policy actions:

1. Continue promoting both universal and specialized education by:

- ✓ Removing all barriers behind abandon of children from the universal education programs due for example to the poverty of the families to get food, or to the weakness in implementing the school feeding program, to the lack of school's materials, including some school fees, etc. Removing barriers pushing children going to the domestic work or tea plantations, etc
- ✓ Orienting to the twelve years' programs all students not selected for schools of excellence and to TVET's programs and other technical schools all Students not selected for high learning education. These are mostly eligible for industries, hotels, etc
- ✓ Preparing 6-12 months special training on different topics for universities graduates to allow them diversifying the job opportunities, etc

2. Reinforcing on job trainings in favor of young professionals both in government system and private sector, especially in priority sector Growth such as agriculture, mining, ICT, investments, etc

3. Reviewing actual BDF criteria to support all kind of graduates in creating jobs to practice the acquired knowledge.




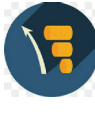






4.3. Challenges-Opportunities Analysis of the Rwanda Competitiveness

To determine the country's competitiveness level, World Economic Forum assess on how country enables the environment at institutions, infrastructure, ICT adoption and Macroeconomic level, how it improves the human capital (Health and Skills), how are the Markets (product Market, Labor Market, Financial system and Market size) and how is the Innovation ecosystem (business dynamism and innovation capability).

Based on the below Global Competitiveness report (2018), in enabling the environment, Rwanda got 64% in enabling institutions, 51% in infrastructure development, 27% in ICT adoption and 72% in macroeconomic environment. In Human capital development, Rwanda has been given marks of 61% in Health improvement and 41% in Skills development. For Markets, Rwanda has been marked 57% in product Market, 62% in Labor Market, 55% in financial system and 34% on Market size. At the Innovation ecosystem, Rwanda has been given 61% in business dynamism and 27% in novation capability.

As observed from this challenges-opportunities analysis, Macroeconomic environment with 71%, Health improvement, Labor market and business dynamism with 61%; 61% and 62% respectively are more competitive sector while ICT, skills development, Market size and innovation capability are the sectors needing more attention as they are ranked less than 50%.

To redress this situation of low competitiveness of Rwanda, the government should among other strategies, improve the quality of the local produced products which could be done through reinforcing the capacity of SMEs and other startups using among other programs like matching grant of EGF "Export Growth Facility", the HACCP or Hazard analysis and critical control points project in RSB and certification system by RSB "Rwanda Standards Board". GoR should also tackle issues related to the poverty, source of low human development index behind the low productivity.

Competitiveness Index 4.0 2018 edition (Rwanda)											
Performance Overview 2018											
Overall Score	Enabling Environment		I C T adoption	Macroeconomic stability	Human Capital		Product Market	Markets		Market size	Innovation ecosystem
	Institutions	Infrastructure			Health	Skills		Labor Market	Financial system		
Overall											
51%	64%	51%	27%	72%	61%	41%	57%	62%	55%	34%	61%
											27%

Source: World Economic Forum (Global Competitiveness Index report 2018)

5. Conclusion, Findings and Policy Actions

5.1. Conclusion & Findings

This study on “Rwanda in Africa Continental Free Trade Area (AfCFTA): Challenges-Opportunities Analysis” aimed at assessing the challenges-opportunities from Rwanda industrialization, labor productivity and competitiveness, then finding out the required policy actions to allow Rwanda competing successfully in AfCFTA.

Specifically, the research topic aimed:

1. To conduct a challenges-opportunities analysis of industrialization, labor productivity and competitiveness in Rwanda
2. To find out the needed policy actions to allow Rwanda competing significantly in AfCFTA

Research questions are as follows:

1. How are the challenges-opportunities from the industrialization, labor productivity and competitiveness in Rwanda?
2. What are the required policy actions to allow Rwanda competing gainfully in AfCFTA?

To achieve these objectives, the researchers applied scientifically recognized techniques such as documentary, unstructured interviews with professionals from MINICOM, PSF, NISR and MINECOFIN to get data and views on some points and methods like historical and comparative methods.

As detailed in the document, the findings revealed that Rwanda has opportunities like of having strong institutions and leadership, stable macroeconomic situation, favorable investment environment, strong health care system, etc and challenges such as high transport cost for both imported finished goods and raw materials as landlocked country (1,416 kilometers from the Indian Ocean and 1,250Km from the Atlantic Ocean), industries with insufficient and low quality raw materials; insufficient and inadequate energy; high production cost, low human development index (0.524, 158th out of 189 countries: UNDP, 2018), lack of needed specializations and skills for industrial development, etc. The below developed policy actions have been proposed to overcome the above highlighted challenges and so move on.

5.2 Policy Actions

From the detailed policy actions in the document, the following are the required key policy actions:

1. To mitigate risks from being landlocked country, initiating, promoting and maintaining the regional economic communities spirit like EAC, COMESA and AfCFTA, is a sine qua non condition for industrial and trade development in Rwanda.
2. To Reduce 20% from the today's recurrent budget rate averaged at 51% (2009-2018), taking 5% each year for 4 years in favor of the required basic infrastructure, in subsidizing among other raw materials, transport costs, strengthen the products certification system in RSB, etc
3. Apply progressively the Big Push or Unbalanced Growth theories of prioritizing the more impactful sector
4. To Continue promoting both universal and specialized education, reinforcing social programs to improve the Human Capital Development, source of high productive capacity and productivity.

As the presented research was for identifying challenges hindering the development of industrialization, labor productivity and competitiveness in Rwanda, opportunities and required policy actions to overcome these challenges, the researchers are calling upon other researchers to continue topic related researches guiding GoR how to compete significantly in AfCFTA.

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The effect of trade credit on financial performance of manufacturing Small and Medium Enterprises (SMEs) in Rwanda

Byombi Kamasa Vedaste and Charles Ruranga

Abstract

Financial sector strategies have been on the heart of the Government of Rwanda and access to finance is among the priority areas of the plan. Much emphasis was put on Business Development Fund (BDF) as the main drive of access to finance in comparison to other sources of finance for SMEs. Despite its importance as a source of finance for SMEs, trade credit has been generally given less attention in literature globally and in Rwanda particularly. This study examines the effect of trade credit on financial performance of manufacturing SMEs in Kigali City the capital of Rwanda. Trade credit terms, supplier position and volume of purchase were taken as study predictor variables. Based on a population of 382 manufacturing SMEs operating in Kigali, a sample of 92 SMEs was drawn using a coefficient of variation technique. A survey design was adapted using questionnaires for data collection and both descriptive and inferential statistical methods were used in data analysis. Multiple regression analysis was utilized to examine the relationship between dependent that is profit margin and independent variables selected are trade credit terms, suppliers' position and the volume of purchase. Finding revealed that trade credit have contributed to the financial performance of SMEs and full payment and years of experience have contributed highly on financial performance of manufacturing SMEs in Rwanda. The study found out that SMEs which use trade credit as source of finance to their business perform better than non-users of trade credit. This study gives a huge contribution in the literature of trade credit to enhance profitability. The study recommends that policies related to trade credit must be put in place to enhance the functioning of trade credit activities.

Keywords: Trade credit, trade credit terms, financial sector, profit margin financial sector

1. Introduction

Small and Medium Enterprises (SMEs) are an important engine in the development of each country since they play a vital role in economic growth and job creation (Love and Roper, 2013). Globally, they have contributed much to the overall Gross Domestic Product (GDP) of countries. SMEs contribute 60% in China, 57% in Germany, 55% in Japan and 48 % in USA. In the same way, they contribute to the creation of employment where SMEs account for between 55 per cent and 80 per cent of total employment in Western Europe, Japan and USA (Ngu and Thomas, 2013). In Kenya they represent 90% of all enterprises with GDP of 18% and employ 60% of the workforce (Katua, 2014). In Uganda SMEs employ more than 90% of the private sector and contribute over 18% to total GDP (Ministry of Trade, industry and cooperative, 2015) while in Rwanda SMEs comprise 98% of the businesses and 37% of all private sector employment and contribute 55% of GDP with manufacturing enterprises alone accounting for 7% of total GDP (NISR, 2018).

SMEs have generally been experiencing failure in their first years. In South Africa, around 400,000 firms close their businesses in the first five years of their existence (Adcorp, 2012) while most new firms do not grow to maturity in Kenya since they collapse before the fifth year (Katua, 2014). The government of Rwanda has however done great improvement in supporting SMEs. Despite this, SMEs operating in manufacturing have shown slow growth compared to those operating in services and agriculture (Sophia and Man, 2013). Limited access to finance is the most critical constraints to the growth (Kamunge, Njeru and Tirimba, 2014, Klyton & Ngoga, 2017). Yet, studies show that access to finance has direct positive impact on performance of SMEs (Kinyua, 2015).

Financial sector in Rwanda has been developing at high speed and many innovations and initiatives were put in place to tackle some issues related to finance. Financial institutions find it as a risk to lend to SMEs given the cost/benefit ratio in terms of time and resources required to process SME loans as well as the difficulties most SMEs face in consolidating capital and creating business plans to become viable lending candidates. Despite the government initiative of putting in place BDF, SMEs are still financially disadvantaged due to lack of collateral required by financial institutions (Klyton & Ngoga, 2017). It is acknowledged that lack of access to finance is the most critical constraints to the growth of SMEs (Kamunge, Njeru, & Tirimba, 2014; Cant, Erdis, & Sephapo, 2014). Bank credit is commonly used by small businesses but traditional bank finance poses challenges to SMEs mainly newer, innovative and fast growing companies, with a higher risk-return profile (OECD, 2015).

Firms with good credit history which can easily access other sources of finance and able to fulfill banks requirement play an intermediary role of redistribution of funds. Firms with better access to bank credit pass part of it to their less liquid customers via trade credit (Kabir & Zubair, 2015). Trade credit has been for many times considered as substitute or complement of bank finance. Firms both give and receive trade credit to finance their business activities, in their turn receivables can be pledged as collateral for further financing opportunities to obtain additional bank credit against the receivable (BURKART & ELLINGSEN, 2004). Firms with lack of access to bank finance depend more on trade credit, firms will always use bank finance as first option, (McGuinness & Hogan, 2016). Firms with access to bank finance will grant more credit to their customers. Therefore, access to bank finance is expected to positively relate to net trade credit (Afrika, & Gyapong, 2017). Trade credit financing is preferred by new and young SMEs when the risk of default is high during the early years of operations (Fatoki and Odeyemi, 2010). Offering more trade credit to SMEs can assist them in their post-entry survival, thereby strengthening their opportunity to succeed (Yano and Shiraishi, 2012). In the same way, it has been found that trade credit enhances supply chain efficiency by serving as a risk sharing mechanism (Yang and Birge, 2013). At the end firms which lack access to bank finance depend more on trade credit (McGuinness and Hogan, 2016).

The connection between bank and trade credit finance is the main motive of conducting this study which another powerful source of finance together with bank finance. This study thus focuses on trade credit as one of the sources worth studying. Trade credit is a form of finance given by suppliers (trade credit payable) who provide goods on credit and allow a certain delay in payment for the customer to sell and pay thereafter, keeping a certain portion as profit. This is a common practice in many countries mainly those which have no strong financial systems where access to normal lending by financial

institutions is quite difficult (Yazdanfar & Öhman, 2017). The clear understanding of the relationship between trade credit and profitability leads to business development of firms. SMEs use trade credit as tool to promote financial performance. Regardless of the level of profitability even firm with low profit margin claim to boost their sales through trade credit (García-Teruel & Martínez-Solano, 2014).

In Rwanda, trade credit has also been in growing use from 2011 to 2015 when it moved from 146 to 259 firms which claimed utilizing trade credit as an alternative source of finance in their business. Moreover, 3% of firms testified that they used trade credit finance as a source of finance to start their businesses in Rwanda (NISR, 2017). Investigating the effect of trade credit in Rwanda was found that trade credit has contributed to the financial performance. The findings revealed that the extent to which loan size of financial facility has affected the firm's financial performance is to a very great extent (Muchiri, Shukla, & Kibachi, 2017). Despite its importance all over the World, trade credit has been for a long time ignored in literature (Long, 1993). While many theories of trade credit are related to firm performance, there has not been a direct test on whether firms actively use them to manage their growth (Annalisa and Klass, 2013). Many studies discussed about the determinants of giving and receiving trade credit but there is a shortage in the extent to which trade credit affect profitability of SMEs (Tang, 2014). Trade credit literature has been much focused on developed economies and less attention has been put to developing countries. Many studies use secondary data and there is also a need to assess the effect of trade credit on financial performance using primary data (Kapkiyai and Mugo, 2015).

2. Literature review

When suppliers sell goods on credit to their respective customers, accounts payable are created and it acts as an important source to business finance. If practices are set and followed up in accounts payable, they can have quite a positive impact on the company's profitability. This helps the firm pay its bills on time and build trust with suppliers. Once there is trust, suppliers will try to help customers in a number of ways as trade credit does not require much information as financial institutions, suppliers rely more on soft information like trust, reputation of the customers, and payment record. From all these suppliers can assist the customers in many ways such as offering discounts which positively impact profitability in a big way (Fabbri and Klapper, 2008). The unsynchronized timing of disbursements and payment for goods and services means that trade credit can be regarded as a short-term loan tied in both timing and value to the exchange of goods provided by a supplier to its customers (Ferris and Stephen, 1981). Trade credit is an important form of financing for businesses in a broad range of industries and economies.

Trade credit is an important source of finance to SMEs because of its dual nature; most companies simultaneously buy their goods on credit and sell their goods on credit. The key focus for the study was on firms which receive trade credit (trade credit payable) from their suppliers. Emphasis is on trade credit terms, supplier's position and the volume of purchase as predictor variables. Trade credit term pertains to a period in which trade credit is going to be paid back. Trade credit has a much shorter maturity time than bank credit. Generally, it matures in 30 or 90 days. Trade credit terms have a two ways agreement, either full payment is required or installment payment. The length of the period is usually specified in the contract; for example, a "net 30" agreement would mean that payment is due within 30 days of the product delivery. On the other hand, trade credit agreement is called two-part terms. In this contract, the supplier may offer a discount if payment is made within a certain period that is shorter than the net payment period. Most times suppliers apply the agreement of "2/10 net 30" in which the buyer is given a discount of 2% if payment is realized by the tenth day following delivery (Bragg, 2017). Trade credit terms play an important role in financial performance of firms because it implicates interest rate that significantly influences firm profitability (García-Teruel & Martínez-Solano, 2014).

Suppliers' position was another predictor variable examined by the study to examine if it has any effect on financial performance of Manufacturing SMEs in Kigali. In all business activities, there is always an examination of the close working relationship between the suppliers and customers. It has been found that firms with weaker market power are willing to extend trade credit to their customers for them to have a big portion of goods sold. It is also clear that firms which receive trade credit are also willing to extend trade credit to others as to meet the agreed deadline (Fabbri and Klapper, 2013).

Some suppliers are able to provide trade credit to their customers to induce them to carry more of the manufacturer's products (Dong, Guo and Turcic, 2016). In an unfamiliar business environment to a firm, supplier willingly extends credit to allow customers sufficient time to test the product (Klapper, Leaven and Rajan, 2012). Large firms are willing to give trade credit to their customers but they are not interested in receiving goods on credit. Non-financial firms which have enough amount of collateral and positive sales growth they have no need to grant trade credit. Firms which have lesser amount of collateral to get financing from banking channel are more willing to get financing from trade credit channel. Firms which have positive sales growth try to maintain this and so they are more willing to arrange financing from trade credit channel (Jaleel, Hui, & Jaweria, 2014).

The volume of purchase is the third predictor variable studied. It is more related to the firm's size and age. In the study by Jézabel and Jérôme (2011) it was found that purchase volume to be granted is dependent on firm size and size of collateral. Purchase volume to be granted is also highly correlated to the financial health in environment of imperfect financial markets and low financial development (Jézabel & Jérôme, 2011). Furthermore, larger firms with better access to both internal and external financing at a lower cost require less credit volume from suppliers. Hence, usually firms with larger growth opportunities make greater use of credit to fund additional sale volumes. Some suppliers prefer to give to their customers goods related to the quantity they are willing to take and most of time customers willing to buy big quantity are more favored than those taking a small quantity. Several other studies have discussed the importance of the volume of transactions to the duration of trade credit. They argued that if a buyer purchases small quantities, they get shorter trade credit periods. The idea is that the buyer pays back the debt from their own sales earnings. For this reason, suppliers assume that customers buying small quantities will be able to sell the goods within a shorter period and pay the debt (Garcia and Solano, 2010). According to Dong, Guo and Turcic (2016) when customers have a good credit worthy record, they are likely to receive big quantity of goods needed from their suppliers thereby increasing their net profit. Firms in competitive market or recently innovated are significantly more likely to offer trade credit to their customers. Firms that operated in a competitive market are also more likely to increase the volume of goods sold during the crisis. Again firms in competitive markets are more likely to extend credit than firms in less competitive markets. Overall, these results suggest an additional burden on firms in competitive markets during the crisis, which might have increased their financial vulnerability (Klapper & Randall, 2010).

Referring to the theoretical part of the research, some empirical study show clearly the impact of trade credit on financial performance of SMEs. In the study done Yazdanfar and Ohman (2016) the impact of trade credit use on firm profitability in Sweden, the findings indicate that trade credit as a funding source has a significant negative influence on firm profitability indicating that firms with low trade credit are more profitable. Moreover, trade credit and firm age were found to negatively influence profitability, liquidity level, while firm size was positively revealed to have influence on profitability. Further study findings indicate that larger and younger SMEs with low levels of trade credit and high liquidity access are more likely to be profitable than are other SMEs. Although, some coefficients vary between industry sectors, the general conclusions hold for all five sectors studied.

Yazdanfar and Öhman (2017) found that trade credit is a source of finance among SMEs particularly short term debt and long-term debt in 15,897 Swedish firms in five industry sectors in the period from 2009 to 2012. They used OLS, fixed-effects and generalized method of moment to analyse a large cross-sectional panel data. It was revealed that trade credit and that short-term debt positively influences trade credit mainly when it complements other short-term debts and replaces long-term debts. In addition, firm size in terms of sales was found to be positively correlated with trade credit while firm age was found negatively correlated to trade credit. Fabbri and Klapper (2013) show that firms use trade credit as a competitive gesture. Hence, suppliers are more likely to offer trade credit and better credit terms to powerful and important customers who also are more likely to enforce payment periods longer than the ones offered and to generate overdue payments.

In the study on trade credit and SMEs performance using a sample of 71 SMEs in the Netherlands from 2009 to 2013, it was discovered that trade credit is positively related to profitability (Tang, 2014). SMEs were therefore advised to use trade credit and other short-term financing because they do not require collateral (Yazdanfar, 2012). In another research on trade credit and financial performance of small scale enterprises in Kenya in 2015, secondary data from 50 SMEs was utilized. The measure of performance which were employed were profit margin, liquidity, and return on equity. Data was

analyzed using SPSS and both inferential and descriptive statistics were used. It was found that trade credit positively affected liquidity, profit margin and return on assets (Kapkiyai and Mugo, 2015). A similar result was found in a related research on the effect of trade credit on financial performance of SMEs in Kenya in 2014 which as well, used secondary data from population of 6624 SME registered in Nakuru town and a sample of 197 SMEs. Both descriptive and inferential statistics were used to show the relationship between trade credit and financial performance and it was found that profitability, liquidity and inventories have a positive and significant effect on SME performance (Kang'ethe and Kalio, 2014).

Firms' financial performance includes profitability measures such as gross profit margin, net profit margin for example return on sales, return on equity, economic value added, return on equity less cost of equity and return on capital employed. There are also other performance measures and among them; free cash flow over sales and growth measures for example historical revenue growth. Ideally, forward-looking measures such as expected profitability, cash flow and growth should be used to measure a firm's performance (Kiaritha, 2015). Profit can also be used to measure the performance of firms. This implies that profit is used to measure the financial performance of the firms (Agha, 2014). In the light of this research financial performance referred to profit. The research identified intervening variables which affect financial performances of SMEs and among them are; types of business activities, years of experience.

3. Methodology

The research design is a descriptive survey which uses both qualitative and quantitative methods for triangulation. The target population is all manufacturing SMEs operating in Kigali City meaning that all SMEs in the three districts of Gasabo, Kicukiro and Nyarugenge which equal to 382 (NISR, 2014). These firms are classified according to their areas of operation. The selection of Kigali City was based on the evidence that it covers more than half of the total number of SMEs in Rwanda. Manufacturing SMEs were also selected because it is an area of the country's interest in the promotion of made in Rwanda products. The main respondents are SMEs owners and other people in the leadership position of the SMEs. The period of study was from 2012 to 2018 (NISR, 2017). The study used the coefficient of variation method, stratified random sampling technique and simple random sampling to select a sample of 92 SMEs required by the research (Nassiuma, 2000).

$$n = \frac{382 * (22)^2}{(22)^2 + (382 - 1)(22)^2} = 92$$

Where: n=sample size, N=population, C= coefficient of variation, e=standard error. The sample was obtained using coefficient of variation. It should be noted that in most surveys or experiments, a coefficient of variation in the range of $21\% \leq C \leq 30\%$ and a standard error in the range $2\% \leq e \leq 5\%$ is usually acceptable (Nassiuma, 2000). In the research a coefficient variation of 22% and a standard error of 2% were used. To achieve the objective, primary data was collected using questionnaire.

Data analysis was done using both descriptive and inferential statistical techniques. In descriptive statistics frequencies, means and standard deviation were used. Linear multiple regressions were formulated to establish and explain the relationship between trade credit, supplier position, volume of purchase and profitability (financial performance). At the end a correlation analysis was used to test the relation between users and non-users of trade credit on financial performance of manufacturing SMEs. The relationship between the study variables and SMEs financial performance was developed into multiple linear regression model as follows:

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

Where: Y = SMEs Financial performance (profit) is the dependent variable, β_0 = Intercept of the model, a constant, X_1 trade credit term, X_2 suppliers' position X_3 volume of purchase, and ϵ being the error term.

Table 1:

Linear regression							
___4makesprofit	Coef	St.Err	t.value	p-value	[95% conf	Interval]	sig
volumeofpurchase	0.288	0.185	1.55	0.125	-0.082	0.657	
Tradecreditterms	-0.520	0.090	-5.80	0.000	-0.699	-0.341	***
Suppliersposition	-0.081	0.160	-0.51	0.613	-0.401	0.238	
Constant	4.036	0.549	7.35	0.000	2.941	5.131	***
Mean dependent var		2.307	SD dependent var			1.684	
R-square		0.493	Number of obs			75.000	
F-test		22.969	Prob>F			0.000	
Akake crit.(AIC)		247.171	Bayesian crit. (BIC)			256.441	

****p*<0.01, ***p*<0.05, **p*<0.1
Source: Stata 15

Summary results for the model used in the study. The adjusted R square value reveals that trade credit, volume of purchase, suppliers' position account for 0.493 (49.3%) in terms of variation in financial performance of manufacturing SMEs when all other factors are controlled for. This implies that 50.7% of variance in financial performance of manufacturing SMEs in Kigali is explained by other factors.

4. Findings

Table 2:

Trade credit terms and volume of purchase							
Trade credit terms	volume of purchase						
	0%	less than 25%	25%	50%	75%	100%	Total
From 1 day to 10	3 27.27	2 18.18	1 9.09	1 9.09	2 18.18	2 18.18	11 100.00
From 11 days to 20	1 33.33	0 0.00	1 33.33	1 33.33	0 0.00	0 0.00	3 100.00
From 21 days to 30	2 13.33	0 0.00	1 6.67	2 13.33	10 66.67	0 0.00	15 100.00
From 31 days to 60	1 16.67	0 0.00	1 16.67	0 0.00	2 33.33	2 33.33	6 100.00

From 61 days to 90	8 61.54	1 7.69	2 15.38	0 0.00	0 0.00	2 15.38	13 100.00
NA	25 89.29	1 3.57	1 3.57	0 0.00	1 3.57	0 0.00	28 100.00
5 Month	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	1 100.00
Total	40 51.95	4 5.19	7 9.09	5 6.49	15 19.48	6 7.79	77 100.00

First row has frequencies and second row has row percentages

Source: Stata 15

Interpretation:

From primary data it was found that 51.95% of respondents were not using trade credit as a source of finance. Hence study findings reveal that 19.5% of the respondent had 75% of all their volume of purchase through trade credit, 9.1% had 25% of their purchase from their suppliers on credit, 7.8% had 100% of their purchase from their suppliers on credit and 5.2% had less than 25% of their purchase from their suppliers on credit.

On side volume of purchase, 13% of the respondents said they used trade credit and were given a trade credit term between 1 day and 10 days, 2.6% got trade credit terms between 10 to 20 days; 20.8% received trade credit terms of 21 to 30 days, 6.5% were given 31 to 60 days of trade credit terms, 2.6% had trade credit terms of 60 to 90 days while 1.3% had trade credit terms of 5 months. A big percentage of respondents using trade credit falling in the range of 21-30 days. others were given a trade credit term below 20 days. From other researches it was found that the longer the trade credit terms, the more the profit the firm generates. Large and creditworthy borrowers received long credit terms from their suppliers (Klapper, Leaven and Rajan, 2012).

Tabulation of Trade credit terms Suppliers position

Trade credit terms	Suppliers position						Total
	0%	less than 25%	25%	50%	75%	100%	
From 1 day to 10	3 27.27	1 9.09	3 27.27	1 9.09	1 9.09	2 18.18	11 100.00
From 11 days to 20	1 33.33	0 0.00	0 0.00	1 33.33	0 0.00	1 33.33	3 100.00
From 21 days to 30	2 13.33	0 0.00	0 0.00	1 6.67	5 33.33	7 46.67	15 100.00
From 31 days to 60	1 16.67	0 0.00	0 0.00	0 0.00	2 33.33	3 50.00	6 100.00
From 61 days to 90	7 53.85	1 7.69	1 7.69	2 15.38	1 7.69	1 7.69	13 100.00
NA	24 85.71	1 3.57	0 0.00	1 3.57	0 0.00	2 7.14	28 100.00

5 Month	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	1 100.00
Total	38 49.35	3 3.90	4 5.19	7 9.09	9 11.69	16 20.78	77 100.00

First row has frequencies and second row has row percentages

Source: Stata 15

Interpretation:

On the side of supplier's position, the study finds that 20.78% of respondents testified that their suppliers were able to supply 100% of what they needed on credit and 9.1% reported that their suppliers provided them 50% of good they needed on credit and again 11.69 % reported that their suppliers provided them 75% of the goods they needed on credit. Further, 5.19 % said that their suppliers were able to provide 25% of the good on credit while 3.9% said that their suppliers were able to provide less than 25%.

Table 3: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.702 ^a	0.493	0.471	1.225

Table 3 portrays model summary results for the model used in the study. The R square value reveals that trade credit, volume of purchase, and suppliers' position account for 0.49.3 (49.3%) in terms of variation in financial performance of manufacturing SMEs when all other factors are controlled for. This implies that 50.7% of variance in financial performance of manufacturing SMEs in Kigali is explained by other factors. Given the above results, the researcher sought to examine the confounding effect of other variables in terms of the contribution they make in the model to financial performance (profitability) of manufacturing SMEs in Kigali. Hence, two other independent variables; full payment and years of experience were added in the model. The findings reveal a positive change indicating that selected independent variables contribute to financial performance (profitability) of SMEs in Kigali as shown in Table 4. The finding revealed by the Adjusted R square value indicate that when all other factors are held constant, 71.1% of variance in financial performance of manufacturing SMEs in Kigali is explained by the three independent variables (trade credit terms, supplier position, volume of purchase) plus the intervening variables (full payment, and years of experience,). Hence the study model reaches statistical significance given the results of ANOVA with a P value of 0.000 which is congruent with the null hypothesis that $P > 0.005$. This result is congruent with what has been found by other theorists Kapkiyai and Mugo (2015), who argue that trade credit positively affects liquidity, profit margin and return on assets.

Table 4: Model summary after addition of other independent variables

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.855 ^a	.731	.711	.910

This means that full payment has a big impact of financial performance of SMEs using trade credit and this can be justified by the fact that a customer who is able to pay the full debt of the trade credit given, was able to sell and take part of the profit and give back the principle on one. On the other side suppliers who receive full payment from the customer will increase the trust to the customer and thereafter will either increase the volume of purchase or extend the trade credit term to that customer (ALARCÓN, 2011).

Table 5: Financial performance of users and non-users of trade credit

Trade received	Mean	N	Std. Deviation
Users of trade credit payable	3.61	36	1.536
Non users of trade credit payable	1.10	39	.502
Total	2.31	75	1.684

From the table 5, it is clear that there is a difference between users of trade credit and non-users of trade credit. The mean score of users of trade credit is 3.61 while the mean of non-users is 1.10. To shed more light on the research I examined the standard deviation, and it was noticed that users of trade credit have the standard deviation of 1.536 and non-users of trade credit have the standard deviation of .502 which is far different from the users' standard deviation (Tang, 2014).

5. Discussion of findings

From the findings it was found that trade credit has been a powerful engine in boosting profitability of SMEs. Trade credit terms have been seen as very short, 23.4% of the respondents were given trade credit terms which is 30 days and below whereas 10.4% received a trade credit term of 31 days and beyond. Customers particularly large and creditworthy borrowers who receive long credit terms from their supplier (Klapper, Leaven and Rajan, 2012). The volume of purchase through trade credit reveal that 27.3% were beyond 50% of good on credit whereas 14.3% received less than 50% of what they got on credit. The finding are related to trustworthy of the customers as the way of being granted a big volume of purchase on credit . Firms in competitive market or recently innovated are significantly more likely to offer trade credit to their customers (Dong, Guo , & Turcic D, 2016). Suppliers position, the study finds that 40.3% of respondents testified that their suppliers were able to supply them from 50% up to 100% of what they needed on credit. Among respondents 11.7% said that their suppliers where able to supplier 50% and below of what they needed on credit (Dong, Guo , & Turcic D, 2016).

The summary of the model after adding other independent variables indicates that when all other factors are held constant, 71.1% of variance in financial performance of manufacturing SMEs in Kigali is explained by the three independent variables (trade credit terms, supplier position, volume of purchase) plus the intervening variables (full payment, and years of experience,). This result is congruent with what has been found by other theorists Kapkiyai and Mugo (2015), who argue that trade credit positively affects liquidity, profit margin and return on assets. This goes in the same line with what has been found that trade credit as a funding source has a significant influence on firm profitability (Yazdanfar & Öhman, 2017). This can be interpreted that the users of trade credit have performed better than non-users of trade credit. This goes in the same way as what has been found by Tang (2014) who found out that profitability is positively related to the trade credit. Firms can receive more profitability via acquiring trade credit from supplies.

The study contradict the one done Yazdanfiar and Ohman (2016) the impact of trade credit use on firm profitability in Sweden, a panel data set covering 15,897 Swedish SMEs in five industry sectors from 2009 to 2012 was used. Data was analyzed using several statistical techniques such as ANOVA and multiple regression analysis. The findings indicate that trade credit as a funding source has a significant negative influence on firm profitability indicating that firms with low trade credit are more profitable. Again firms in competitive markets are more likely to extend credit than firms in less competitive markets. Overall, these results suggest an additional burden on firms in competitive markets during the crisis, which might have increased their financial vulnerability (Klapper & Randall, 2010).

6. Conclusion

From the findings above, it is clear that trade credit in Rwanda is still a challenge among SMEs where more than 50% of surveyed SMEs are not familiar with trade credit and therefore do not use it to finance their business activities. With regard to what motivate suppliers to give trade credit to customers, it was found that their desire to grow sales was key. Only 1.3% was driven by need to financially empower small SMEs. Trade credit terms among SMEs were found to be still problematic given short periods of time offered to SMEs between 21-30. In terms volume of purchase it was realized that 19.5% had 75% of all their volume of purchase through trade credit, 9.1% had 25%, 7.8% had 100% while 5.2% had less than 25% of their purchase on credit.

Regarding suppliers position, it was also discovered that 48.1% of respondents do not take trade credit, 22.1% say their suppliers are able to supply 100% of what they need on credit and 9.1% reported their suppliers provide 50% - 75% of their goods while 7.8% got 20% of credit from their suppliers and 3.9% received less than 25%. In terms of individual factor contribution of predictor variables to the outcome or dependent variable. The summary of the model showed that 45.6% of financial performance of SMEs is determined by trade credit terms, volume of purchase and suppliers position. By adding other variables in the model, it was noticed that 71.1% of financial performance of SMEs was due to trade credit terms, volume of purchase, suppliers position, years of experience and credit full payment. When removing variable which are not contributing much in the model (years of experience), it was found that 71.5% of financial performance was due to trade credit terms, volume of purchase, suppliers position and full payment of the credit. Overall, trade credit, volume of purchase, suppliers' position as well as full payment variables in the model were found to account for 71.5% of variance in profitability or financial performance of manufacturing SMEs in Kigali when all other factors are controlled for. I pushed the analysis far to compare the means and standard deviations of the users and non-users of trade credit and found out that trade credit users performed better than non-users of trade credit.

7. Recommendations

In all, the study draws the following recommendations; government should put in place clear policies governing trade credit in Rwanda for many SMEs to use it as an alternative source of finance due to its value in supporting firms in their financial performance. Do awareness campaigns and use incentives for suppliers and customers who adopt to use trade credit as it was noticed that nearly more than half of the respondents said that they do not use trade credit as a source of finance to their business. Moreover, literature shows that trade credit is a powerful source of finance to SMEs. The government should put in place policies to help customers acquire long trade credit terms for them to boost sales and make profit. This is because trade credit terms in Rwanda is still given at short duration as study findings show that a big number of respondents were given between 21-30 days which adversely impacts on profitability. As the government has put in place Business Development Funds (BDF) to help SMEs find finance in financial institutions. Another channel can be developed where customers can be facilitated to get trade credit from their suppliers to help SMEs mainly the new one to operate.

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