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Effect of Determinants of Entrepreneurial Innovation on Economic Growth in Sub-Saharan Africa

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ABSTRACT

The currently observed continued incorporation of hidden and non-technological innovations, together with the emergence of the modern day fourth industrial revolution is actually contributing to change in our understanding of innovation and its measured contributions to success in entrepreneurship. This study provides a quantitative longitudinal study of the determinants of innovation, their role in entrepreneurship innovation capacity and how they collectively add value to economic growth in sub-Saharan Africa. The study used fixed effects with country dummies in the analysis where Stata software was used. The results generated are expected to be useful in enabling other researchers and practitioners to navigate the complex web of innovation definitions and typologies and how they collectively impact on economic growth in the poor world. The empirical results indicated that capital for domestic investment, labour, innovation and foreign direct investment were positively and significantly correlated with economic growth in SSA. It was concluded that brain drain, absence of excessive bureaucracy and red tape, venture capital availability, intensity of local competition among firms and tertiary education gross enrolment were positively and significantly correlated with economic growth in SSA. It is recommended that respective countries should put in mechanisms to capitalize from the positive benefits of brain drain, absence of excessive bureaucracy and red tape, venture capital availability, intensity of local competition among firms and tertiary education gross enrolment on the economy. This could be through increased investments in tertiary institutions and reduction of bureaucracy and corruption that will not only increase high quality production through increased labour productivity but will also foster fair competition in the markets.

Keywords: Entrepreneurship, innovation, economic growth, Sub-Saharan Africa.

1.0 Introduction

Developing countries have become increasingly aware of the important role that innovation and organizational efficiency play in driving economic growth and development. Cameron et al. (2015) revealed that adoption and imitation of foreign technology involves the use of technology licensed by foreign-owned companies in order to enhance productivity and efficiency. Imitation is associated with the extent to which firms invest in imitative research activities when adopting foreign technology (Cameron et al., 2015).

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The developing countries are likely to realize organizational efficiency gains by conducting internal R&D programs, and by using foreign technology for production. However, successful adoption of foreign technology is also dependent on the degree and capacity to absorb which is directly associated with the internal research and development and HCD. Thus, this study asserts that internal R&D in combination with the foreign technology adoption significantly enhances efficiency in the context of organizational efficiency in Sub-Saharan Africa.

Innovation is the mother of a technically efficient firm or entrepreneur and in turn an efficient firm is one in which an increase in an output requires an increase in possibly one input or a reduction in one other output. Moreover, a decrease in an input has to be accompanied by a reduction in at least one other output or an increase in one other input (Koopmans, 2017; Porcelli, 2019). Thus, the notion of technical efficiency relates to the maximization of output subject to a given set of factors of production. Inefficiency is the difference between the observed output and the maximum possible output depending on the technology used. The production possibilities frontier (PPF) normally provides the microeconomic foundation of technical efficiency of a given firm. It defines the maximum possible output that can be achieved by a given firm using a given set of inputs and technology. However, deviations from the maximum possible output arise due to inefficiencies. To determine efficiency differences between firms normally entails estimating the point on the production frontier where efficient firms are located. The inefficiency scores of the remaining firms are then derived by obtaining their deviation from the frontier (Chen et al., 2015; Gumbau-Albert and Maudos, 2016). Most of the postmodern scholars have often viewed this issue by pointing out that efficiency in productivity had been largely ignored because of the inherent difficulties encountered in determining producers' potential and the producers' achievement of that potential.

Despite being widely known that efficiency measures are essentially success indicators with which producers are evaluated, economic theory has for a long time not been able to provide a theoretical framework shedding light on factors influencing efficiency in production (Fried et al., 2018). Nevertheless, several authors examine determinants of efficiency using firm-specific characteristics, external factors, ownership, and dynamic disturbances that may arise from the degree of a firm's technological innovation (Caves, 2019; Cheruiyot, 2017; Vu, 2016).

Contrastingly, firm-level innovation by means of investing in internal R&D is a risky and costly path-dependent process in comparison to the adoption of foreign technology (Fu et al., 2016). Griffith et al. (2016) supports the argument by providing evidence supporting the idea that interacting foreign technology adoption with internal R&D yields efficiency gains. Internal R&D is a key innovation input that is fundamental in explaining technical efficiency arising from the development of new technologies at the firm-level (Baumann and Kritikos, 2016; Bonanno, 2016; Guan and Yam, 2015).

Sustainable growth is the best method to fight poverty and innovation is main key to achieving sustainable growth. Unfortunately, small enterprises in countries such as Kenya, South Africa, Indonesia and Vietnam are only growing at a snail's pace Vermeulen and Knoben (2019). The duo also goes ahead to make more arguments that Innovation in Sub-Saharan Africa is strongly linked to the economic growth in the region. They argue that the larger the innovation by an entrepreneur the larger the amount of work offered to more people, and hence more knowledge, more development opportunities and more economic influence.

Most of the business ventures in sub-Saharan Africa are involved in innovation and knowledge-based ventures though at small scales. Most of the new ventures are formed to exploit poverty, absence of competition, coming up with solutions to challenging situations and self-defeating political governance. This means that most of the entrepreneurs and intrapreneurs are involved a variety of businesses under varying conditions with most of them coming up with innovations to either start new businesses to address certain situations or as a way of making ends meet. This is however done under different conditions which determine the success or failure of the innovations and the rate at which they are developed. Success and the rate at which the innovative ideas are put into play has far reaching contributions to the economies of nations involved. However, despite the likely benefits of entrepreneurial innovation on economic growth, little effort has been made to determine the relationship between entrepreneurial innovation and economic growth in sub-Saharan Africa. This paper therefore carried out an investigation on the relationship between determinants of entrepreneurial innovation and economic growth in sub-Saharan Africa in an effort to better understand how SSA countries could boost their economic growth if necessary interventions were put in place to increase entrepreneurial innovation.

This paper is organized into five main sections. The first section above comprises the research background and introduction. The second section comprises the literature review. The third is the methodology which comprises the data used and its sources, theoretical model and empirical models employed in the study. The fourth comprises the discussion of findings of the paper based on the regression results. The fifth comprises the conclusions and recommendations, followed by a list of references used in the study.

2.0 Literature Review

In an International Journal of Innovation Studies, in an article under the title the environment and diversity of innovation, Monica (2018) notes that the available vast body of existing literature emphasizes the important function of innovation in the field of socioeconomic development and financial growth. These

observations were made in respect of the previous academic works in the same area (Fagerberg, Martin, & Andersen, (2016); Lundvall, (2016); Chen, Yin, & Mei, (2018)); The observations by Monica (2018) fell in tune with other observation which described innovation as a collective intellect of reason in development of humankind and this clarified in terms of the inventive ability of invention being a source of technological, cultural, and social change.

Fagerberg (2018) also participated in Holy Grail's innovative discussions on economic growth and global sustainability programs despite the large number of available documents, it is very difficult to give a clear definition of innovation and clearly define its nature. Another concept of Innovation renaming is a multi-faceted concept that combines different meanings and interpretations with a different perspective; some of them exist in emerging fields such as new studies (Fagerberg and Verspagen, 2016). However, several authors have attempted to capture the essentials of innovation and develop new common typologies (Garcia & Calantone, 2016; Linton, 2019; Oke, 2017). These state agreements and recent contributions from the Mainstream Innovation Study (IS) sparked controversy among students of innovation about the future of IS (Fagerberg et al., 2018). innovation should focus on the relationship between technological and non-technical factors that contribute to the creation and adoption of successful innovations, the social dimensions of creative processes, and the type of value created from innovation, among other things. Perhaps it is at this stage that Martin (2016) sees the challenge for the next generation of IS researchers to think, explain, and come up with improved ways of measuring, analyzing and understanding new.

Monica (2018) described design as a key focus in the field of growth of technology in the invention and use of scientific and technical acquaintance. Monica (2018) also highlighted three natural inventions such as Invention, novelty and evolution. Another version of the concept is that innovation is seen as a procedure and result of building or creating new things that make wider economic outcomes and technological advances (Nelson & Winter, 2017). According to Freeman (2016) the etymological view of the new term suggests that the term has been used to cover an extensive variety of processes in which human technology emerges over time.

There are some scholars who do not think of new things being tangible, for example, Porter (2015) emphasized that inventions do not require the effect of material. Porter (2015) described innovation as a novelty of doing things by focusing on higher trading profits. Martin (2016) conveys the argument by confirming that, the value of inventions is in the public interest as defined by the emerging social market. The challenge of Innovation is to transform ideas into new ones and to build social corporate wealth. In one relevant report, it was shown that there are important factors or drivers that give details of the gradual change in corporate governance. These include global challenges and changes in public and social policies, global access to information, networks and new ways to generate value in partnership with customers and access user-related information (Organization for Economic Cooperation and Development -OECD).

In a study done by Edwards-Schachter and Wallace (2017), it was found that integration of new technologies is accompanied by an increase in environmental concerns, which included consecutive calls to the new capacity to respond to endurance and challenges. This was also the same time that Mazzucato (2017) highlighted the need to establish what he called a policy of innovation. At the same time, Fagerberg (2017) has confirmed that new inventions should play a key task in transforming the face of the challenge of providing better models of how policy can help in innovating new objects for this purpose. However, Lundvall (2016) presents a divisive view by suggesting that renaming as a learning process that connects people with different skills or organizations with incompatible skills interacting together. Organizations often engage in information exchange and problem solving through collaborative learning as part of the innovation process. During this process, organizations establish relationships that can be termed organizations that create new organizations, networks, collections, or programs. Many actors apart from being entrepreneurs and individual firm owners are other public ambassadors and third parties such as activists, social entrepreneurs, NGOs, government agencies and provinces.

Differences such as diversity are also common in modern management literature on short-term sector interactions in terms of new processes, such as research efforts demonstrated in Van de Ven's (2016) work analyzing new processes by looking at the participation of firms, multi-team networks, and communities. Edwards-Schachter and Wallace (2017) notes that in addition to the communicative learning process there is a sense of social familiarity and a contribution to social change. This is due to the social and technological changes, which are not found in the larger IS field, and are studied management that can be linked to new inventions. Garcia and Calantone (2016) point out that new technologies for the fourth industrial revolution (4IR), Navigation, cloud computing, Internet of Things (IoT), artificial intelligence (AI), Augmented reality (AR) and big data empower the future of everything intelligent "and empowers businesses, consumers, and society as a whole to become drivers of new technologies (OECD, 2017). However, most of the new driving technologies only participate in distributed production, or in the interdisciplinary activities between manufacturing and technical services and automation technologies (Meuter, 2000). A little related to the above is the sustainable demand-driven innovation mentioned by Pansera and Owen (2018) in a study of innovations that surpass Western paradigms by analyzing paradigms and new experiences from China and India (Chen et al., 2018).

In deciding on which variables to be included in the study, this paper classifies the independent variables based on the classification adopted by Valliere and Peterson (2009) whereby the variables are classified into three sets, that is based on the new economic geography, endogenous growth theory and national systems of innovation classes. However, due to data unavailability for the endogenous class, it was omitted and in its place the administrative burden of start-ups class introduced which was split from the national systems of innovation class as it can stand alone. Based on the the classifications of Valliere and Peterson (2009), the variables whose data was available are as in Table 2 in the appendix section. The variable on administrative burden for start-ups has been broken down into various components and treated on its own instead of being treated as a variable in the national systems of innovation.

3.0 Methodology

The data for this study has been sourced from various data sets. The data covers the period 2010 to 2016 and this was largely determined by data on determinants of entrepreneurial innovation and other key entrepreneurial variables whose data was only available for this period. The countries were selected on the basis of their belonging to a common geographical location, SSA, hence very comparable. Out of the 48 SSA countries, only 30 of the countries were included in the study as others did not have sufficient data available for most of the variables. The countries in the study included; Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Chad, Cote D'Ivoire, The Gambia, Ghana, Guinea, Kenya, Lesotho, Madagascar, Mali, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Seychelles, South Africa, Tanzania, Uganda, Zambia, Zimbabwe, Gabon, Liberia and Malawi.

For the purposes of this study, the variable of interest is gross domestic per capita income growth (annual GDPPPC) which is used as a measure for economic growth in the respective countries. Data on annual GDPPPC growth was obtained from the FAO in its 2018 macro statistics key indicators. The other variable of interest is the determinants for innovation by entrepreneurs in respective countries in SSA and its data was sourced from the World Economic Forum Report of 2016 in its global information-technology report. Other data variables of interest included extent of staff training, intellectual property protection, venture capital availability, availability of latest technologies, government procurement of advanced technology, intensity of local competition, number of days to start a business, quality of management schools and tertiary education gross enrolment rate all sourced from the world economic forum of 2016 in its global information-technology report. Other data variables included brain drain rates that was sourced from the Quality of government institute standard dataset version of 2019, absence of excessive bureaucracy and red tape whose data was sourced from the Mo Ibrahim Foundation, and cost to register a business whose data was sourced from the World Bank. Other variables included number of start-up procedures to register a business both general and by gender, time required in days to start a business both in general and by gender and cost of start-up procedures as a percentage of GNI per capita in general and by gender and their data was sourced from the WB development indicators dataset

The data also included economic variables that included the gross domestic per capita data that was sourced from the International Monetary Fund world economic outlook (WEO) database of April 2019, gross capital formation as a percentage of GDP and labour force participation rate that were sourced from the WB development indicators dataset.

4.0 Theoretical models

This paper used the traditional neo-classical aggregate production function theoretical model to investigate the effect of determinants of innovation in entrepreneurship and economic growth in Sub-Saharan Africa. This theoretical model has been adopted as similarly used by Chanie (2017) and it takes the form of:

$$Y_{jt} = AK_{jt}^{\alpha} L_{jt}^{1-\alpha} \quad \ldots\ldots (1)$$

Where:
Yjt = gross domestic product (GDP) in country j in year t
Kjt = capital stock in country j in year t
Ljt = labour in country j in year t
A = a parameter that measures total factor productivity (TFP)
α and 1-α are the elasticities of capital and labour from the total production.
Taking logarithms on both sides of equation (1), the equation becomes:

$$lnY_{jt} = C + \alpha lnK_{jt} + (1-\alpha) lnL_{jt} + U_{jt} \quad \ldots\ldots (2)$$

Equation (2) can further be simplified to become:

$$lnGDPPPC_{jt} = \beta_0 + \beta_1 lnK_{jt} + \beta_2 lnL_{jt} + U_{jt} \quad \ldots\ldots (3)$$

where β_0 is a constant term, $lnGDPPPC_{jt}$, lnK_{jt} and lnL_{jt} are the natural logarithms of $GDPPPC_{jt}$, K_{jt}, and L_{jt} respectively while U_{jt} is the error term. β_1 and β_2 are elasticity coefficients of capital and labour respectively.

Where:

GDPPPC = Gross domestic product per capita, constant prices (Purchasing power parity; 2011 international dollar) in country j in year t

K = Gross capital formation (% of GDP) in country j in year t

L = Labour force participation rate, total (% of total population ages 15+) in country j in year t

FDI = Foreign direct investment, net inflows (% of GDP) in country j in year t

j and t are countries and time in years respectively where j =1, 2, ……. 30 and t = 1, 2, …….7

5.0 Empirical Model

To investigate the relationships between the determinants of entrepreneurial innovation capacity and economic growth, equation (3) is further modified into model (4) in appropriate form by including the FDI (Foreign direct investment and net FDI inflows (% of GDP) and determinants of entrepreneurial innovation in the log-linear model so as to facilitate the use of appropriate estimation methods as follows:

$$lnGDPPC_{jt} = \beta_0 + \beta_1 lnK_{jt} + \beta_2 lnL_{jt} + \beta_3 lnFDI_{jt} + \beta_4 lnBD_{jt} + \beta_5 lnHFP_{jt} + \beta_6 lnABRT_{jt} + \beta_7 lnEST_{jt} + \beta_8 lnILC_{jt} + \beta_9 lnTEGE_{jt} + \beta_{10} lnIPP_{jt} + \beta_{11} lnVCA_{jt} + \beta_{12} lnALT_{jt} + \beta_{13} lnGPAT_{jt} + \beta_{14} lnQMS_{jt} + \beta_{15} lnCRB_{jt} + \beta_{16} lnNDSB_{jt} + \beta_{17} lnTRSB_{jt} + \sum_{j=2}^{30} c_j D_j + U_{jt} \quad \text{..... (4)}$$

Where:

GDPPPC = Gross domestic product per capita, constant prices (Purchasing power parity; 2011 international dollar) in country j in year t

K = Gross capital formation (% of GDP) in country j in year t

L = Labour force participation rate, total (% of total population ages 15+) in country j in year t

FDI = Foreign direct investment, net inflows (% of GDP) in country j in year t

BD = Brain drain

HFP = Hiring and firing practice

ABRT = Absence of Excessive Bureaucracy & Red Tape

EST = Extent of staff training

ILC = Intensity of local competition

TEGE = Tertiary education gross enrollment rate, %

IPP = Intellectual property protection

VCA = Venture capital availability

ALT = Availability of latest technologies

CRB = Cost to register a business, % of GNI per capita

GPAT = Gov't procurement of advanced tech

QMS = Quality of management schools

NDSB = No. days to start a business

TRSB = Time required to start a business (days)

Where Dj is a dummy variable for country j and cj stand for the difference between the intercept for country j and that of the first country.

The coefficients. β_1 to β_{17} are elasticity coefficients and U is the error term. Given the different conditions in different countries, a set of country dummy variables will be added in the estimation of equation (4) so as to take care of country differences.

NB: The variables were developed using 7-point likert scales for respondent perceptions except for TEGE and others which are in percentage form as explained in the summary statistics.

6.0 Results

This section presents regression findings and discussion of results on the effect of determinants of entrepreneurial innovation on economic growth in SSA. The results were estimated based on equation (4) using fixed effects regression with country dummies and the elasticities of the independent variables are as presented in Table 1. To address any possible challenges of heteroscedasticity, robust option was included in the Stata command when running the results using fixed effects regression with country dummies. The Hausman test was carried out and had a prob>chi2 of .0000, implying that fixed effects estimations were preferred to random effects estimations. The results in column 1 were estimated using random effects estimation while the results in column 2 were estimated using fixed effects estimation. However, to take care of country difference, the results

in column 3 were estimated using fixed effects regression with country dummies and were thus used for interpretation purposes. The R2 value for the estimation in column 3 in Table 1 is very high at .999 implying that 99.9 percent of economic growth is explained by the included independent variables in the regression.

From the results on socioeconomic variables in the model in Table 1, three findings can be drawn. Firstly, the elasticity of gross capital for domestic investment (K) is 0.0679 which is positive and statistically significant at 0.01 as shown in column 3 in Table 1. The results imply that all factors held constant; an increase in gross capital for domestic investment by 1 percent leads to an increase in economic growth by 0.0679 percent. As explained above, capital especially for domestic investment is a key contributor to economic growth of any economy since its availability implies that domestic investors have access to adequate capital for investment purposes in productive activities hence positively contributing to the growth of the economy. The results are in harmony with those of Odhiambo (2009).

Secondly, labour was found to positively correlate economic growth and statistically significantly. The elasticity of labour is 0.557 which is positive and statistically significant at 0.01 as shown in column 3 in Table 1. The result implies that an increase in labour by 1 percent leads to an increase in economic growth by 0.557 percent. This result is plausible and as expected since given that most of the productive activities in most of SAA are labour intensive and since the labour provides the manpower which is necessary in running the various sectors of the economy and in the management of the business enterprises and hence necessary for production. An increase in labour especially the skilled category is key for increased production quantity and quality of new products and this has a multiplier effect on the economy. The labour force is also a source of market for the various goods and services produced in the economy. The results are in harmony with those of Luci (2009) who found a positive relationship between labour force and economic growth.

Thirdly, foreign direct investment (FDI) has a positive and significant effect on economic growth. The elasticity of FDI is 0.00160and statistically significant at 0.01 as shown in column 2 in Table 1 implying that an increase in foreign direct investment by 1 percent could increase economic growth by 0.00160 percent. FDI inflow brings with it new investments and this plays a pivotal role in boosting economic growth. FDI inflow many a times comes with new technologies and innovative ways of doing business which brings about an expansion in productive capacity in various sectors of the economy. The results are in harmony with those of Choe (2003) and (Odhiambo, 2009). However, Inekwe (2013) observes that FDI affects economic growth differently depending on the sector of the economy with his study finding a positive effect on the service sector and a negative effect on the manafacturing sector.

From the results on determinants of entrepreneurial innovation variables in the model in Table 1, a number of findings can be drawn. Firstly, the elasticity of extent of staff training (EST) is 0.245 which is negative and statistically significant at 0.01 as shown in column 3 in Table 1. This result was not as expected since staff training is a preliquisite for acquisition of new knowledge and skills that are essential for effective performance at the workplace. However, the data on this varible showed that majority of staff were lacking sufficient training. According to Adesola et al. (2013), education and tratining increases job satisfaction which then in this case will lead to increased productivity.

Secondly, the elasticity of brain drain is 0.289 which is positive and statistically significant at 0.01 as shown in column 3 in Table 1. The result implies that an increase in brain drain by 1 percent leads to an increase in economic growth by 0.289 percent. This result is plausible and as similarly found by other scholars who have argued that in most cases brain drain ends up contributing positively to domestic economies since most of the highly qualified staff who move to other countries for greener pastures make investments back in their home countries. Most authors argue that brain drain affects the economy in two way; one is that, prospective job migrants heavily invest in their education before migrating and secondly through investments back home after migration as similarly found by Beine et al. (2001). However, Hemmi (2005) argues that brain drain has a negative effect on economic growth in the long run even though in the short run it contributes positively to the economy.

Secondly, the elasticity of hiring and firing practice is 0.0436 which is positive but statistically not significant as shown in column 3 in Table 1. The results imply that if hiring and firing flexibility increases by 1 percent, then there is a likelihood of an increase in economic growth by 0.0436 percent. Hiring and firing flexibility gives managers room to make changes in the staff composition that are necessary for increased business performance and hence an increase in productivity. According to Kleinknech et all (2006) identifies two forms of labour flexibility, that is, internal flexibility which refers to functional forms of flexibility of labour and external flexibility which refers to numericalforms of flexibility. The latter has high shares of people who are on temporary contract or with a high turnover of personnel hence yielding substantial savings of the firm's wage bill. However, these savings on the firm's wage bill lead to higher job growths without translating into higher sales growth for the firm and thus externally flexible labour tends to lower labour productivity growth with the effects being different for innovating firms as compared to non-innovating firms. This implies that the effect on the economy will depend on what hiring and firing forms are adopted by the business firms. On the other hand Sharma (2006) indicates that labour inflexibility affects the economy negatively leading to unemployment. However, the results for this variable are insignificant.

Thirdly, the elasticity of absence of excessive bureaucracy and red tape is 0.0390 which is positive and statistically significant at 0.05 as shown in column 3 in Table 1. The results imply that an increase in absence of excessive bureaucracy and red tape by 1 percent could lead to an increase in economic growth by 0.039 percent. Less bureaucracy and red tape in a given economy means that things move faster with much flexibility. These findings are in harmony with those of Duvanova (2014) who found that excessive bureaucracy and red tape especially by government lead to corruption which then in this case could lead to negative effects on the economy.

Fourthly, the elasticity of intellectual property protection is 0.0467 which is positive but statistically insignificant as shown in column 3 in Table 1. The results imply that an increase in in the rate of intellectual property protection by 1 percent could lead to an increase in economic growth by 0.0467 percent even though the result is insignificant. Intellectual property protection is a key element in the economy of any given country as it ensures that it's intellectual property rights and those of its citizens are protected and the benefits that accrue from such rights benefit the various sectors of the economy. When the citizens are assured of the protection of their intellectual rights, this encourages creativity and innovation leading to the development of new technologies necessary for increased production efficiency hence positively contributing to the growth of the economy. The results are in harmony with those of Kim et al. (2012) found that patent protection was an important determinant of innovation and that patentable innovations contributed to economic growth mostly in developed countries. However, they observed that this may not be the case in developing countries.

Fifthly, the elasticity of venture capital availability is 0.0899 which is positive and statistically significant at 0.05 as shown in column 3 in Table 1. The results imply that an increase in venture capital availability by 1 percent could lead to an increase in economic growth by 0.0899 percent. The result is plausible and as expected since an increase in venture capital availability implies that most entrepreneurs can easily access the required capital to start and or expand their business enterprises. These new and or expanded enterprises lead to production of new goods and services which in the end lead to increased business activities in the economy and these ends up having a positive contribution to the economy. This result is in harmony with the findings of Samila and Sorenson (2011) who found that increases in the availability of venture capital has a positive effect on firm starts, employment and overall income which may have a positive effect on transfer of knowledge between employees and also to starting up of new businesses. All these can then have a positive effect on the economy.

Sixthly, the elasticity of availability of latest technology is 0.0297 which is negative but statistically insignificant as shown in column 3 in Table 1. The result is not as was expected as a negative coefficient is an indicator that new technologies were diminishing over time hence the negative effect. On the contrary an increase in the availability of latest technologies is bound to have a positive effect on economic growth and this is a key feature in most advanced economies but in most developing economies much of where SSA countries fall, are lagging behind. Countries with the latest technologies are able to adopt new production methods which increase their output considerably unlike countries without such technologies. According to Carlaw and Lipsey (2003), technology doesn't directly contribute to economic growth but through the continuous creation of opportunities for technological development.

Seventhly, the elasticity of cost to register a business as a percentage of GNI per capita (CRB) is 0.00831 which is positive but statistically insignificant as shown in column 3 in Table 1. The result is as was expected the positive coefficient is an indicator that the cost of registering businesses was diminishing over time hence the positive effect on the economy even though the result was insignificant. High cost of registering a business becomes a hindrance to prospective entrepreneurs as it making it generally expensive to start and run a business. This is in harmony with the findings of Eifert et al. (2008) who found that indirect costs accounted for a relatively high share of business firms in African countries hence posing a problem of lack of competitiveness and performance and this scenario could have a spillover effect on the economy.

Eight, the elasticity of government procurement of advanced technology (GPAT) is 0.0123 which is negative and statistically insignificant as shown in column 3 in Table 1. The results imply that governments in the region were procuring less and less of advanced techonologies over time and this was not assisting the economies. This could be due to the fact that most governments in the region are financially constrained due to the high poverty levels in SSA which means that governments may not have spare capital for procurement of the advanced technologies that are necessary to boost production. This is also given the limitation of the necessary knowhow that will be required to operationalize the advanced technologies if procured. This result is in harmony toCarlaw and Lipsey (2003) who found no direct relationship between technology and economic growth.

On intensity of local competition (ILC), the elasticity of intensity of local competition is 0.168 which is positive and statistically significant at 0.01 as shown in column 3 in Table 1. The results imply that an increase in the rate of intensity of local competition by 1 percent could lead to an increase in economic growth by 0.0467 percent. Higher intensity of competition among firms trigers creativity and innovative ways in a bid to outdo each other in the market and in the process this leads to new ways of doing business with a possible result of better products and incresed productivity. This has an effect of directly contributing to the growth of the

economy. This result is in harmony with the findings of Saviotti and Pyka (2008) who found a positive relationship between business competition and economic development. Saviotti and Pyka (2008) indicate that there are two types of business competition, namely intra-competition and inter-competition and concluded that the best contitions for economic development is realized when the best ratio between the two forms of competition are attained.

On number of days to start a business, the elasticity of number of days to start a business is 0.0892 which is positive but statistically insignificant as shown in column 3 in Table 1. The results imply that despite the insignificance of the results, a decrease in in the number of days to start a business by 1 percent could lead to an increase in economic growth by 0.0982 percent as depicted by the data. This implies that it was taking less time to start a business in the region and this has an implication of inducing the start of more new business enterprises and this could result in a positive effect on the economy. The fewere the number of days required to start a new business to more the businesses that are likely to be started which then has a positive effect on economic development. This is in harmony with the findings of Dejardin and Fritsch (2011) who found a positive relationship between new businesses and regional economic development.

On quality of management schools, the elasticity of number of quality of management schoolsis 0.00664 which is positive but statistically insignificant as shown in column 3 in Table 1. The results imply that an increase in the quality of management schoolsby 1 percent could lead to an increase in economic growth by 0.00664 percent as depicted by the data. High quality of management schools in a given country gives an assurance that the country is in a position to get quality manpower that is essential in the management of firms in the economy and with better management, the firms will perform better and this makes a positive contribution to the economy. The results are in harmony to those of Adelakun (2011) who observes that the development and utilization of human capital is an important tool in a nation's economic growth and that an institutional framework should be put in place to so as to look into the manpower needs of the various sectors of the economy so as to implement policies that will see overall economic growth.

On tertiary education gross enrollment rate (TEGE), the elasticity of tertiary education gross enrollment rate is 0.0213 which is positive and statistically significant at 0.1 as shown in column 3 in Table 1. The results imply that an increase in the rate tertiary education gross enrollment rate by 1 percent could lead to an increase in economic growth by 0.0213 percent. An increase in the percentage of the population that transits to tertiary education is an indication that the populace gets sufficient knowledge and skills that are essential in making a contribution to the productive capacity of respective countries hence the positive effect on economic growth. Transition to higher education ensures that the country has enough trained manpower to propel the countries to greater heights of development and this is in harmony with the findings of Adelakun (2011) who found a positive relationship between economic development and utilization of human capital is important tool in a nation's economic growth

On start-up procedures to register a business (SUPRB), the elasticity of start-up procedures to register a business is 0.124 which is negative and statistically significant at 0.05 as shown in column 3 in Table 1. The results imply that an increase in the start-up procedures to register a business by 1 percent could lead to a decrease in economic growth by 0.124 percent. This result is plausible and as expected since an increase in the start-up procedures to register a business could mean that it will not only take long to register a business but it will also cost more to register such businesses. This has an overall effect of leading to less new businesses being started in the economy leading to a slowdown in the economy. This is in harmony with the findings of Dejardin and Fritsch (2011) who found a positive relationship between new businesses and regional economic development, implying that if start-up procedures were many, then they could result in fewer new businesses which could eventually affect the economy negatively.

On time required to start a business which is closely related to the start-up procedures to register a business, the elasticity of time required to start a business is 0.00288 which is negative and statistically significant at 0.05 as shown in column 3 in Table 1. The results imply that an increase in in the time required to start a business by 1 percent could lead to a decrease in economic growth by 0.00288 percent. The result for this variable is plausible and as expected as the more the time is required to start a business the more it is likely to cost and hence negatively affect the number of new businesses that come up which could explain the negative effect on the economy. This result is similarly close to the result on start-up procedures in that the longer the time it took to start a business, the fewer the number of businesses that will be started in the economy and this could result in a negative effect as argued by Dejardin and Fritsch (2011). New businesses inject new products into the economy hence contributing to the increase in the country's GDP and hence a positive effect on the economy. However, from the results, there is an implication that it was taking long to start new business in the region and this was affecting the economies in the region negatively.

Table 1.
Effect of determinants of entrepreneurial innovation on economic growth.

	(1)	(2)	(3)
VARIABLES	lnGDPPC	lnGDPPC	lnGDPPC
lnK	0.0610	0.0679***	0.0679***
	(0.0373)	(0.0237)	(0.0212)
lnL	0.143	0.557***	0.557***
	(0.287)	(0.198)	(0.193)
lnFDI	0.00217	0.00160*	0.00160*
	(0.00776)	(0.00490)	(0.00551)
lnEST	-0.242	-0.245**	-0.245**
	(0.153)	(0.0980)	(0.114)
lnBD	0.0565	0.289***	0.289**
	(0.132)	(0.0871)	(0.125)
lnHFP	-0.0545	0.0436	0.0436
	(0.0738)	(0.0477)	(0.0437)
lnABRT	0.0381	0.0390**	0.0390**
	(0.0284)	(0.0181)	(0.0170)
lnIPP	0.118	0.0467	0.0467
	(0.0957)	(0.0611)	(0.0554)
lnVCA	0.0736	0.0899*	0.0899**
	(0.0761)	(0.0483)	(0.0407)
lnALT	0.0533	-0.0297	-0.0297
	(0.145)	(0.0932)	(0.0928)
lnCRB	-0.0189	0.00831	0.00831
	(0.0147)	(0.00959)	(0.00932)
lnGPAT	-0.0429	-0.0123	-0.0123
	(0.118)	(0.0750)	(0.0735)
lnILC	0.157*	0.168***	0.168***
	(0.0876)	(0.0553)	(0.0547)
lnNDSB	0.0378	0.00892	0.00892
	(0.0249)	(0.0161)	(0.0179)
lnQMS	0.146	0.0664	0.0664
	(0.122)	(0.0788)	(0.0764)
lnTEGE	0.0384*	0.0213*	0.0213*
	(0.0200)	(0.0127)	(0.0127)
lnSUPRB	-0.154*	-0.124**	-0.124**
	(0.0894)	(0.0578)	(0.0494)
lnTRSB	0.0570	-0.00288**	-0.00288**
	(0.0510)	(0.0333)	(0.0276)
Constant	8.151***	4.694***	4.127***
	(1.470)	(1.007)	(1.065)
Country Dummy	re	fe	Yes
Observations	210	210	210
R-squared		0.691	0.999
Number of id	30	30	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
NB: re = random effects, fe = fixed effects

7.0 Conclusion and recommendation

From the findings of the study, it was concluded that brain drain, absence of excessive bureaucracy and red tape, venture capital availability, intensity of local competition among firms and tertiary education gross enrolment were positively and significantly correlated with economic growth in SSA. On the other hand, extent of staff training, startup procedures to start a business and time required to start a business were negatively and significantly correlated with economic growth in SSA. On the socioeconomic variables included in the regression for this model, all the three variables, that is, domestic capital for investment, labour and foreign direct investment were found to be positively and significantly correlated with economic growth in SSA.

Based on the above conclusion, it is recommended that respective countries should put in mechanisms to capitalize from the positive benefits of brain drain, absence of excessive bureaucracy and red tape, venture capital availability, intensity of local competition among firms and tertiary education gross enrolment on the

economy. This could be through increased investments in tertiary institutions and reduction of bureaucracy and corruption that will not only increase high quality production through increased labour productivity, but will also foster fair competition in the markets. The governments should also increase adopt mechanisms that facilitate increased savings for investment and where possible adopt strategies that will encourage increased inflow of foreign direct investment. On the other hand, the governments and firms in respective countries should put in measures that will assist to minimize the negative effects of extent of staff training, startup procedures to start a business and time required to start a business on economic growth. This could be through encouraging increased budgeting for staff training and adoption of strategies that will see reduced procedures and time taken to register and start new businesses in the region so as to increase the number of new businesses started.

References

Adelakun OJ. (2011). Human Capital Development and Economic Growth in Nigeria. European Journal of Business and Management Vol 3, No.9, 29-38.

Beine M, Docquier F, Rapoport H. (2001). Brain drain and economic growth: theory and evidence. Journal of Development Economics Vol. 64, 275–289.

Bonanno, G. (2016). ICT and R&D as inputs or efficiency determinants? Analysing Italian manufacturing firms (2007–2009). Eurasian Business Review, 6(3), 383-404.

Carlaw KI, Lipsey RG. (2003). Productivity, technology and economic growth: What is the relationship? Journal of economic surveys Vol. 17, No. 3, 457-495.

Caves, D. (2019) "Multilateral Comparisonsof Output, Input and Productivity Using Su- perlative Index Numbers." Economic Journal. 5(1), 10-20.

Chen, J., Yin, X., & Mei, L. (2018). Holistic innovation: An emerging innovation paradigm. International Journal of Innovation Studies, 2(1), 1-13.

Cheruiyot, K.J. (2017), "Determinants of technical efficiency in Kenyan manufacturing sector", African Development Review, Vol. 29 No. 1

Choe JI. (2003). Do Foreign Direct Investment and Gross Domestic Investment Promote Economic Growth? Review of Development Economics, 7(1), 44-57.

Dejardin M, Fritsch M. (2011). Entrepreneurial dynamics and regional growth. Small Bus Econ 36, 377-382.

Duvanova D. (2014). Economic Regulations, Red Tape, and Bureaucratic Corruption in Post-Communist Economies. World Development Vol. 59, 298-312.

Edwards-Schachter (2012) Fostering quality of life through social innovation: A living lab methodology study case, The Review of Policy Research,

Eifert B, Gelb A, Ramachandran V. (2008). The Cost of Doing Business in Africa: Evidence from Enterprise Survey Data. World Development Vol. 36, No. 9, 1531-1546.

Fagerberg, J. (2017). Innovation policy: Rationales, lessons and challenges. Journal of Economic Surveys, 31(2), 497-512.

Fagerberg, J. Martin R., & Anderson J. (2016). Innovation, Economic Development and Policy: Selected Essays. Edward Elgar Publishing.

Fried H., Nambisan, S., Siegel, D., & Kenney, M. (2018). On open innovation, platforms, and entrepreneurship. Strategic Entrepreneurship Journal, 12(3), 354-368.

Fu, X., Woo, W. T., & Hou, J. (2016). Technological innovation policy in China: the lessons, and the necessary changes ahead. Economic Change and Restructuring, 49(2-3), 139-157.

Garcia R. and Calantone R., 2002 A critical look at technological innovation typology and innovativeness terminology: A literature review. Journal of Product Innovation Management, 19 (2) (2002), pp. 110-132

Griffith, R., Harrison, R., & Van Reenen, J. (2006). How special is the special relationship? Using the impact of US R&D spillovers on UK firms as a test of technology sourcing. American Economic Review, 96(5), 1859-1875.

Guan, J., & Yam, R. C. (2015). Effects of government financial incentives on firms' innovation performance in China: Evidences from Beijing in the 1990s. Research Policy, 44(1), 273-282.

Hemmi, N. (2005). Brain drain and economic growth: theory and evidence: a comment. Journal of Development Economics 77, 251– 256.

Inekwe, J. (2013). FDI, Employment and Economic Growth in Nigeria. African Development Review, Vol. 25, No. 4, 421-433.

Kim YK, Lee K, Park WG, Choo K. (2012). Appropriate intellectual property protection and economic growth in countries at different levels of development. Research Policy 41 (2012) 358– 375, 358-375.

Kleinknecht A, Oostendorp RM, Pradhan MP, Naastepad CWM. (2006). Flexible Labour, Firm Performance and the Dutch Job Creation Miracle. International Review of Applied Economics Vol. 20, No. 2, 171–187.

Linton G. O (2019) University entrepreneurship education: a design thinking approach to learning. Journal of Innovation and Entrepreneurship 8(1)

Lundvall, B, A. (2016) The learning economy and the economics of hope, Anthem Press, UK, USA (2016)

Martin, R. (2016) Twenty challenges for innovation studies, Science and Public Policy, 43 (3) (2016), pp. 432-450
Mazzucato, M (2013) The Entrepreneurial State: Debunking Public vs. Private Sector Myths, London: Anthem Press (Kindle Edition).
Meuter M.L (2000) Self-Service Technologies: Understanding Customer Satisfaction with Technology-Based Service Encounters. Business Journal of Marketing. 45(3), 23-24.
Monica S.M. (2018). The nature and variety of innovation. International Journal of Innovation Studies, 2(2), 65-79.
Odhiambo, N. (2009). Savings and economic growth in South Africa: A multivariate causality test. Journal of Policy Modeling 31, 708-718.
OECD (2017) Oslo Manual: Guidelines for Collecting and Interpreting Innovation. 3rd ed., OECD, Paris.
Oke R, 2017. "On measuring uncertainty and its impact on investment: Cross-country evidence from the euro area," European Economic Review, Elsevier, vol. 92(C), pages 161-179.
Porter, E. (2016) the competitive advantage of nations, The Free Press, New York (2016)
Samila S, Sorenson O. (2011). Venture capital, entrepreneurship and economic growth. The Review of Economics and Statistics, 338-349.
Saviotti PP, Pyka A. (2008). Product variety, competition and economic growth. Journal of Evolutionary Economics, 18(3-4), 323-347.
Sharma AN. (2006). Flexibility, Employment and Labour Market Reforms in India. Economic and Political Weekly, Vol. 41, No. 21, 2078-2085.
Vu, H. H., (2016). Capital Structure and Financial Efficiency: Evidence from Ho Chi Minh Stock Exchange of Vietnam. Asian Economic and Financial Review, 9(11), 1255.

Appendix

Table 2.
Variables as used in the empirical models.

Construct	Variables
New Economic Geography	BD (Brain drain) HFP (Hiring and firing practice) ABRT (Absence of Excessive Bureaucracy & Red Tape) EST (Extent of staff training) ILC – Intensity of local competition TEGE (Tertiary education gross enrollment rate, %)
National Systems of Innovation	ABRT (Absence of Excessive Bureaucracy & Red Tape) IPP (Intellectual property protection) VCA (venture capital availability) ALT (Availability of latest technologies) CRB (Cost to register a business 5 of GNI per capita) GPAT (Gov't procurement of advanced tech, 1-7 (best)) ILC (Intensity of local competition, 1-7 (best)) QMS (Quality of management schools, 1-7 (best))
Administrative burden of Start-ups	NDSB (No. days to start a business) SUPSBM (Start-up procedures to register a business (number)) TRSB (Time required to start a business (days)) CBSUPM (Cost of business start-up procedures, male (% of GNI per capita))
Social and economic variables	GDPPPC (Gross domestic product per capita, constant prices (Purchasing power parity; 2011 international dollar)) GCF (Gross capital formation (% of GDP)) LFPR (Labor force participation rate, total (% of total population ages 15+) (modeled ILO estimate)) FDIC – Per-capita foreign direct investment