Small Enterprise Research

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rser20

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To cite this article: Jonathan Mukiza Peter Kansheba (2020) Small business and entrepreneurship in Africa: the nexus of entrepreneurial ecosystems and productive entrepreneurship, Small Enterprise Research, 27:2, 110-124, DOI: 10.1080/13215906.2020.1761869

To link to this article: https://doi.org/10.1080/13215906.2020.1761869

Published online: 15 May 2020.

SMALL ENTERPRISE RESEARCH
2020, VOL. 27, NO. 2, 110–124
https://doi.org/10.1080/13215906.2020.1761869

Routledge
Taylor & Francis Group

Small business and entrepreneurship in Africa: the nexus of entrepreneurial ecosystems and productive entrepreneurship

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ABSTRACT

The impact of entrepreneurship and small business activities in Africa has habitually been lower and receives less attention in research. This study aims at investigating the mediation role of innovations on the relationship between entrepreneurial ecosystem approach and productive entrepreneurship. Using panel dataset of 35 African countries, the study contributes to the existing literature in two ways. First, the panel regression findings contribute to the theoretical debate and fill the empirical gap, recent research has been dominated by conceptual works. The findings reveal mixed (positive and negative) and weak insignificant direct influence of eco-factors such as finance, government support and programmes, knowledge, market and culture on productive entrepreneurship. However, their influence is more pronounced when innovations mediate the relationship. Second, it provides new insight to policymakers and practitioners in developing policies and programmes that foster entrepreneurial ecosystems and improved innovation performance for better entrepreneurship development. It concludes with suggestions for future research.

KEYWORDS

Entrepreneurial ecosystems; productive entrepreneurship; innovation; entrepreneurs; startup

Introduction

Entrepreneurship has been considered a vital organ that drives economic growth of many countries (Audretsch & Belitski, 2017). Fostering entrepreneurial ecosystems comes as a strategy to nurture a country's economy by promoting entrepreneurial processes and activities that ultimately support growth of small businesses. Isenberg (2010, p. 3) referred to entrepreneurial ecosystem as a set of interconnected entrepreneurial support elements such as leadership, culture, capital, markets, human skills and support. These elements in turn create a platform for smooth entrepreneurship development that promote economic growth and social welfare (Acs et al., 2018).

Extant studies on entrepreneurial ecosystems focus on distinguishing relevant eco-factors that create vibrant and sustainable entrepreneurial ecosystems (Audretsch et al., 2019). However, less has been done to study the causal relationships between eco-factors and productive entrepreneurship as an eco-output (Nicotra et al., 2018). Acs

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et al. (2018) refer to productive entrepreneurship as any productive entrepreneurial activities that contribute directly or indirectly to economic growth and finally increases total welfare through the production of additional output.

As the response to that inquiry gap Nicotra et al. (2018) develop a measurement framework for testing the causal effects between eco-factors, output and outcome of entrepreneurial ecosystems. These eco-factors are accumulative forms of capital such as financial, institutional, knowledge and social capitals within an ecosystem that enhance productive entrepreneurship (an eco-output) (Mack & Mayer, 2015). As a result of their work Nicotra et al. (2018) concluded by calling for empirical validation of their proposed framework.

Thus, this study contributes to the existing literature in two ways. First by addressing the calls for empirical studies on entrepreneurial ecosystems research (Isenberg, 2010; Malecki, 2018). Research on entrepreneurial ecosystems has been dominated by conceptual studies while few empirical studies being done in developed countries (Corrente et al., 2019). This provides room for empirical studies in other settings with research potentials especially in developing economies. In this research, African countries have been used as a context. The study extends and tests the Isenberg's theoretical framework by arguing that the effect of entrepreneurial ecosystems on productive entrepreneurship is mediated by innovations. Conducive entrepreneurial ecosystems supply necessary resources that promote innovations among entrepreneurs (Del Giudice et al., 2014) and bring about innovative and productive startups. Secondly, the study provides insights for policymakers and practitioners on the direction and the focus of designed policies and programmes in support of entrepreneurial environments and entrepreneurship development in general.

Based on evidence drawn from Global Entrepreneurship Monitor (GEM) panel data from 2014 to 2018 of 35 African countries, the findings reveal that the influence of eco-factors of entrepreneurial ecosystems on productive entrepreneurship is completely mediated by innovation in terms of product and process innovations. The rest of the article proceeds as follows. Section 2 presents for review of literature and hypothesis development. Section 3 discusses the methods. Section 4 presents empirical findings, discussion and implications. Section 5 provides for conclusion, limitations and suggestions for future research.

Literature review and hypotheses development

Entrepreneurial dynamics and development in Africa

African entrepreneurial dynamics evolve around economic, social, political and technological circumstances (George et al., 2016). Even though the African continent has been recognized to have a promising economic trend over the past years, the living standards of her people cannot reflect such economic prosperity. Entrepreneurship comes as a solution for addressing such an income gap among African indigenous (Kimhi, 2010). Economies of many African countries compose of a small number of large companies but many small and medium enterprises (Dana et al., 2018). Thus, the presence of supportive entrepreneurial ecosystems will ensure not only vibrant but also productive entrepreneurship which ultimately stimulate persistent economic growth and improved welfare of people (Ratten & Jones, 2018).

Abubakar (2015) stresses the role played by entrepreneurs and their related startups and the need to be placed as a special focus for entrepreneurship initiatives in Africa. Robson et al. (2009) point out that small enterprises account for about 70 per cent of job creation and contribute about 60 per cent of GDPs in many African economies. For instance, Adom et al. (2018) pose that Ghanaian business is dominated by small and medium enterprises that account up to 92 per cent while creating about 85 per cent of all manufacturing jobs. Similar significant contribution has been found in other parties of the region (Galperin & Melyoki, 2018).

However, these startups are still faced with a number of challenges due to inherent risky environment and political instabilities. Some of the critical identified entrepreneurial challenges being unreliable entrepreneurial assets such as finance, managerial skills and infrastructures (Junne, 2018). Other challenges being poor business support related services such as un-customized governmental programmes, lack of enough incubators, inadequate and unaffordable professional services and un-supportive culture (Madichie & Ayasi, 2018). These challenges hinder entrepreneurial performance and growth in many African countries.

The influence of entrepreneurial ecosystems on productive entrepreneurship

The concept of entrepreneurial ecosystems has been associated with the territorial capacity to create a system of interconnected heterogeneous elements that enhance the formation and development of innovative business ventures (Audretsch & Belitski, 2017). Isenberg (2010) referred to entrepreneurial ecosystems as a set of interrelated and coordinated factors that enables entrepreneurship. These factors include finance, knowledge, culture, infrastructures, institutions, legal and regulatory environments. Presence of these eco-factors creates conducive and quality entrepreneurial ecosystems that foster productive entrepreneurship (Nicotra et al., 2018). Audretsch et al. (2019) referred to productive entrepreneurship as productive entrepreneurial activity that contributes directly or indirectly to the net output of the economy or to the capacity to produce additional output and increase total welfare.

Finance is a necessary resource for entrepreneurs both at startup and scale-up phases. Financial capital is related to funds sourced from different internal (e.g. retained earnings) and external (lenders and investors) sources. Kelly and Kim (2016) provide the set of indicators of reliable financial capital in a certain ecosystem: availability of venture and angel capitals, reliable financial systems with entrepreneur-friendly debt finance (Roundy, 2017).

Institutional capital comprises of government rules, regulations and supporting structures. Legal and regulatory frameworks act as rules of the game and can be incentives or disincentives to productive entrepreneurs. Cohen (2006) identified some of these rules and regulations being easy to do business, tax incentives and business-friendly policies. Additionally, Nicotra et al. (2018) referred to support structures as public or private organizations that support the formation and growth of entrepreneurial ventures via provision of necessary resources and services such as working spaces, infrastructures, coaching and mentorship, professional services and networking. Studies further support that quality of supporting institutions can explain entrepreneurial disparities among countries and regions (Mack & Mayer, 2015).

Another form of capital relevant to entrepreneurs is knowledge capital. This is a necessary capital which is associated with human capital availability and development in an entrepreneurial ecosystem. Nicotra et al. (2018) considered knowledge capital as accumulative stock of knowledge, skills and abilities that can be transferred through entrepreneurial education, trainings, experience and research and development activities (Chen & Wu, 2014). Presence of research institutions and universities facilitates competence and knowledge spill-over within a territory. Additionally, knowledge capital comes as a fundamental resource for innovation which in turn stimulates entrepreneurial initiatives (Sussan & Acs, 2017).

Adler and Kwon (2002) considered social capital as a set of individual and organizational relationships that enable the course of actions and value creation within a society. Tsai (2001) views social capital as a shared resource in the form of networks, rules, norms, values, obligations and opportunities among people. Cultural support and networking determine and shape entrepreneurial decisions of entrepreneurs (Vahid et al., 2019). Social interactions create platforms for entrepreneurial opportunities such as access to information, skills, resources and potential markets. Culture that embrace entrepreneurial success and failure stories develops entrepreneurial aspirations among its members and enables entrepreneurs in gaining legitimacy of their activities.

Market accessibility with reliable revenue paying customers is another contributing factor for productive entrepreneurship (Isenberg, 2010). However, a well entrepreneurial supporting market needs to be with less barriers for easy market entry and exit especially by new firms (Kuratko et al., 2017). A supportive market needs to be large with a variety of demand and dynamic enough to stimulate new startups (Nicotra et al., 2018).

The link between entrepreneurial ecosystems, innovations and productive entrepreneurship

The study postulates that the influence of eco-factors on productive entrepreneurship is more pronounce when innovations mediate the relationship. Innovations drive entrepreneurial process (Kuratko et al., 2017). Innovations through the invention of new products and processes positively impact entrepreneurial performance and socio-economic development (Scuotto et al., 2019). Carayannis and Grigoroudis (2012) add that innovations enable entrepreneurs to continuously identify and explore new ideas and markets that eventually improve customers' satisfaction. Innovative and proactive entrepreneurs are opportunity creators (Del Giudice et al., 2014) and successfully engage in productive entrepreneurial activities more than less innovative entrepreneurs who are associated with low survival rate and stagnant growth.

Given the over-changing economic and business-related environments entrepreneurs and their related startups need to innovate in order to remain competitive (Scuotto et al., 2017). Vibrant entrepreneurial ecosystems are the habitat of such innovative entrepreneurs (Herman, 2018). Economies with quality and conducive entrepreneurial ecosystems have higher innovation performance than economies with poor entrepreneurial ecosystems (Acs et al., 2018). Entrepreneurial ecosystems provide necessary inputs (both intangible e.g. human and technological know-how and tangible e.g. infrastructures) for innovation performance (Carayannis et al., 2017; Ronen et al., 2019).

For entrepreneurs to fully capitalize from innovation the role of knowledge management cannot be ignored (Colin, 1999; Darroch, 2005). Entrepreneurial ecosystems with good network of entrepreneurial oriented universities and research and development institutions tend to have more research-based spin-offs companies as a result of knowledge creation and transfer (Papa et al., 2018; Scuotto et al., 2019). Healthy collaborations within entrepreneurial ecosystems enable entrepreneurs to acquire internal and external knowledge that improve their open innovation (Santoro et al., 2018) and thus effect their performance through cost reduction (Giampaoli et al., 2017).

Following the theoretical background and evidence from extant literature, this study argues a potential link between eco-factors of entrepreneurial ecosystems, innovations and productive entrepreneurship. Therefore, it seeks to test the following hypotheses (Figure 1):

Hypothesis 1: Eco-factors of entrepreneurial ecosystem positively influence productive entrepreneurship (an eco-output).

Hypothesis 2: The influence of eco-factors of entrepreneurial ecosystems on productive entrepreneurship is mediated by innovations in terms of product and process innovations.

Methods

Data and variable measurement

The panel data from 2014 to 2018 of 35 African economies were organized. Table 1 presents the nature of the data deployed and its respective sources. Data were organized from three global databases which are World Bank, United Nations Development Program (UNDP) and Global Entrepreneurship and Development Institute (GEDI). GEDI provides annual reports that assess the quality and depth of entrepreneurial ecosystems of different countries globally based on GEM survey.

Dependent variable

The study focuses on productive entrepreneurship as an eco-output of entrepreneurial ecosystem (Acs et al., 2017). Nicotra et al. (2018) in their measurement framework of entrepreneurial ecosystems suggested different indicators for productive entrepreneurship. Corrente et al. (2019) used a number of high growth startups when comparing entrepreneurial ecosystems in European countries. However, given data accessibility limitations

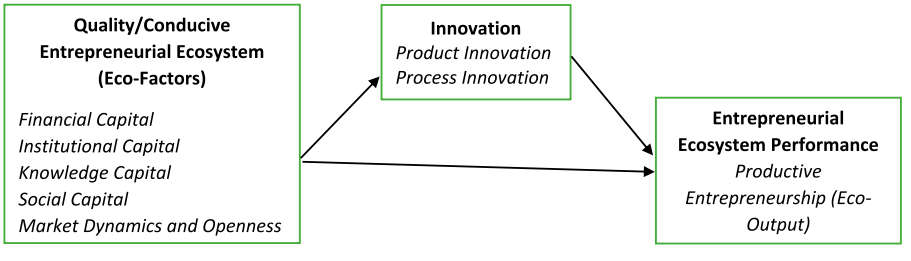

Figure 1. The conceptual framework: The Link between eco-factors of entrepreneurial ecosystems, innovations and productive entrepreneurship.

Table 1. Summary of variable description and related data source.

Variable	Data Source
Productive Entrepreneurship	GEDI
Total early stage entrepreneurial activities as a performance-based indicator	GEDI
Financial Capital	
(i). The availability of financial resource for SMEs (including grants and subsidies)	
Institutional Capital	GEDI
(ii). Government focuses Entrepreneurship as a relevant economic agenda.	
(iii). Government's taxes or regulations are either size-neutral or encourage new and existing SMEs	
(iv). Government set quality programmes directly assisting SMEs at all levels of government (national, regional, municipal)	
(v). Ease access to physical infrastructure (e.g. water, transport, electricity, telecommunication, land, space at affordable prices	
(vi). Support Structure e.g. availability of mentors/advisors, incubators/accelerators	
Knowledge Capital	GEDI
(vii). The extent to which training in creating or managing SMEs is incorporated within the education and training system at primary and secondary levels	
(viii). Post school entrepreneurial education and training	
(ix). Research and Development transfer: The extent to which national research and development will lead to new commercial opportunities and is available to SMEs	
Market Dynamics and Openness	GEDI
(x). The level of change in markets from year to year	
(xi). The extent to which new firms are free to enter existing markets	
Social Capital	GEDI
(xii). Supporting Culture: The extent to which social and cultural norms encourage or allow actions leading to new business methods or activities that can potentially increase personal wealth and income	
Innovation	GEDI
(xiii). Product Innovation capturing entrepreneurs' potentials to develop new products and to adopt or imitate existing products.	
(xiv). Process innovation capturing entrepreneurs' potentials to utilize gained knowledge to apply or create new technology	
Population: *pop aged 15–64 as % of total population*	World Bank
Education Development Index: *Level of education as proxied based of four goals of Education for All (EFA)-universal primary education, adulty literacy, quality of education and gender*	UNDP
GDP growth rate: *Growth domestic product growth rate*	World Bank
Foreign Direct Investment: *Flow as % of net GDP*	World Bank

(as it is difficult to find similar data for Africa), this study chose total early-stage entrepreneurial activity (TEA) as another suggested indicator for performance-based productive entrepreneurship (Herman & Szabo, 2014).

Independent variable

The study deployed eco-factors of entrepreneurial ecosystem as suggested by Nicotra et al. (2018). These eco-factors are financial capital; institutional capital; knowledge capital; social capital and market dynamics and openness. Indices from GEM database were organized for these variables. Descriptions for these variables are provided in Table 1.

Mediating variable

This study hypothesized that the relationship between eco-factors of entrepreneurial ecosystems on productive entrepreneurship is mediated by the innovation. Innovation index is split into two. First, new product innovation captures the country's entrepreneurs' potentials to develop new products and services or improve existing products and services. Second, process innovation captures country's entrepreneurs' potentials to apply or

introduce new technology that enhance competitiveness and ability to satisfy customer demands (Acs et al., 2018).

Control variables

For robust results, the study introduced population (Anyanwu, 2013), education (Atiase et al., 2018), gross domestic product growth rate (Audretsch & Belitski, 2017) and foreign direct investment (Anwar & Sun, 2015) as control variables.

Model estimation

The study aimed at examining the mediation role of innovation on the relationship between eco-factors of entrepreneurial ecosystems and productive entrepreneurship as an eco-output. Panel data modelling was employed where the model was specified as follows:

$$PEjt = \beta_0 + \beta_1 FCjt + \beta_2 ICjt + \beta_3 KCjt + \beta_4 SCjt + \beta_5 MDOjt + \beta_6 INNOjt + \gamma Mjt + c_j + \varepsilon jt, \quad (1)$$

where *PEjt* represents productive entrepreneurship measured as total early stage entrepreneurial activity (TEA) of country *j* at time *t*. *FCjt* stands for financial capital for country *j* at time *t*. ICjt stands for institutional capital for country *j* at time *t*. *KCjt* stands for knowledge capital for country *j* at time *t*. SCjt stands for social capital for country *j* at time *t*. MDOjt stands for market dynamics and openness for country *j* at time *t*. Mjt is a vector for control variables, c_j accounts for unobserved fixed effects while εjt is an idiosyncratic error term.

Furthermore, the presence of multicollinearity problem was tested by using variance inflation factor (VIF). Multicollinearity is the situation when there are very high intercorrelations among independent variables which results in unreliable model results. The VIF results (see VIF results in Appendix 1) for both explanatory and control variables were less than the cut-off point of 5, which indicates the absence of serious multicollinearity problem (Joseph et al., 2014). This was further confirmed by correlation results among variables (see results in Appendix 1), where none of the correlation values were above the threshold of 0.90 (Lensink et al., 2017).

The model specification problem was performed by using the linktest for model specification with null hypothesis that the model is correctly specified. The results show insignificant *p*-value of 0.866 (being greater than the cut-off point of 0.05), meaning that the model is correctly specified (see Linktest results in Appendix 2). Statistically significant Wald's chi-squared furthermore confirm that the model is correctly specified where the regressors explain up to 33 per cent (*R*-squared within) of the variance of the outcome variable.

Given the nature of the data (longitudinal) the choice of analytical method followed the panel regression model selection between random effects and fixed effects estimators where the Hausman test was performed. The Hausman test follows the null hypothesis that the random effects (RE) estimator is appropriate (Hausman & Taylor, 1981). The Hausman test results show the *p*-value of (0.99) being greater than 0.05 led to the acceptance of the null hypothesis that random effects estimator is consistent and appropriate. The findings of this study are consistent and similar (with slight difference) with the study of Corrente et al. (2019) who used different analytical methods (Stochastic multicriteria acceptability analysis (SMAA) and SMAA for strategic management analytics and

assessment (SMAA-S)) to evaluate and compare entrepreneurial ecosystems of European countries. Thus, this confirms further that the obtained results are robust.

Results

Descriptive statistics

Table 2 presents descriptive statistics results. The average index for the productive entrepreneurship in terms of total early-stage entrepreneurial activity has been observed to be 21.7 per cent. This entails that, entrepreneurial ecosystems in emerging economies especially in Africa still has less outputs in terms of productive entrepreneurship. Such argument is further supported by lower scores of eco-factors which denote the quality and extent of entrepreneurial ecosystems. On average eco-factors score between 22 and 43 per cent. Product and process innovations on average found to be 27.7 and 23.7 per cent, respectively. For control variables, population has an average score of 56 per cent while education development has an average 44.4 per cent. Average gross domestic product growth rate has been observed to be 1.2 per cent, where the foreign direct investment as net flow per cent of gross domestic product being 55 per cent.

The link between entrepreneurial ecosystems, productive entrepreneurship and mediation effect of innovations: random effects

Table 3 presents RE estimates of the effects of eco-factors of entrepreneurial ecosystem on productive entrepreneurship and the mediation effects of product and process

Table 2. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Productive Entrep (TEA)	175	21.73	6.89	8.77	42.44
Financial Capital					
Availability of Finance	175	28.58	5.45	14.00	41.22
Institutional Capital					
Gvt-Entrep as Econ Agenda	175	28.61	6.34	14.00	42.11
Gvt-Tax&Bu'cracy	175	26.60	6.43	14.22	46.44
Gvt-Entrep Programmes	175	29.36	6.13	14.89	41.67
Physical Infrastructures	175	42.47	5.40	24.89	53.33
Support Services	175	32.73	4.30	14.00	41.00
Knowledge Capital					
Basic Sch Entrep Edu&Train	175	21.58	5.14	12.67	40.78
Post Sch Entrep Edu&Train	175	31.57	4.90	16.67	43.89
Research and Development	175	26.20	4.93	13.00	38.56
Social Capital					
Entrep Supporting Culture	175	32.03	6.24	19.11	47.78
Internal Market					
Inter Mrkt Dynamics	175	33.71	6.11	19.78	47.89
Inter Mrkt Openness	175	28.24	4.50	14.33	41.44
Innovations					
Product Innovation	175	27.74	16.13	4.00	83.00
Process Innovation	175	23.75	14.78	2.32	67.00
Controls					
Pop	175	56.32	5.24	49.31	68.92
Edu	175	0.44	0.12	0.22	0.70
GDP	175	1.18	4.38	−24.50	24.97
FDI	175	0.55	1.26	−3.59	10.67

Table 3. The link between entrepreneurial ecosystem, innovation and productive entrepreneurship: random effects.

Variables	(1) *Productv Entrep.* Coef	(2) *Productv Entrep.* Coef	(3) *Product Innovation* Coef	(4) *Process Innovation* Coef	(5) *Productv Entrep* Coef	(6) *Productv Entrep* Coef
Pop	0.442***	0.409***	0.011***	0.009*	0.163	0.124
	(0.1162)	(0.1279)	(0.0030)	(0.0056)	(0.1410)	(0.1467)
Edu	13.259***	12.790***	−0.108	−0.076	14.284***	14.495***
	(4.6071)	(4.7215)	(0.1501)	(0.2051)	(4.8397)	(4.9232)
GDP growth rate	−0.103	−0.140*	−0.004***	−0.003	−0.0324	−0.0448
	(0.0823)	(0.0773)	(0.0013)	(0.0020)	(0.0520)	(0.0595)
FDI	−0.446	−0.397	−0.014*	0.001	−0.420	−0.332
	(0.3942)	(0.4039)	(0.0084)	(0.0069)	(0.3543)	(0.3778)
Product Innovation					8.453***	9.364***
					(3.2627)	(3.6078)
Process Innovation					18.131***	18.218***
					(3.4552)	(3.6739)
Finance		0.388	0.029	−0.022		0.507
		(1.5870)	(0.0394)	(0.0252)		(1.3864)
Gvt (Entrep EconAgenda)		−0.614	−0.026	−0.017		−0.171
		(1.5099)	(0.0228)	(0.0251)		(1.2321)
Gvt (Tax&Bu'cracy)		−0.181	0.004	0.001		−0.288
		(1.2846)	(0.0438)	(0.0245)		(1.1336)
Gvt (Entrep Programs)		0.259	0.063**	0.025		−0.599
		(1.7189)	(0.0305)	(0.0289)		(1.3965)
Physical Infrastructures		−0.018	0.039*	0.024		−0.695
		(1.2706)	(0.0235)	(0.0212)		(1.2874)
EntrepSupport Services		−0.992	−0.019	−0.0375		−0.307
		(1.6224)	(0.0394)	(0.0324)		(1.2365)
KnowCapital (BSEET)		−0.722	0.021	−0.003		−0.448
		(1.6534)	(0.0364)	(0.0352)		(1.2041)
KnowCapital (PSEET)		0.205	−0.052	−0.019		0.896
		(1.4703)	(0.0329)	(0.0277)		(1.2742)
KnowCapital (R&D)		−0.278	0.069*	−0.019		0.747
		(1.9666)	(0.0396)	(0.0389)		(1.4178)
InternalMakert Dynamics		0.339	0.040*	0.037*		−0.711
		(0.8551)	(0.0219)	(0.0202)		(0.7628)
InternalMakert Openness		1.865	0.033	0.047		0.351
		(1.823)	(0.0572)	(0.0404)		(1.6019)
Entrep.Culture		−1.728*	−0.030	−0.027		−1.109
		(0.9884)	(0.0297)	(0.0207)		(0.8216)
Constant	−8.667	−2.603	−0.397*	−0.259	−0.194	7.619
	(6.1939)	(8.4996)	(0.2144)	(0.2457)	(6.6762)	(8.4958)
R-squared (within)	0.001	0.03	0.10	0.09	0.30	0.33
Wald Chi^2	49.8***	160.45***	104.41***	61.29***	163.70***	325.08***
Hausman Test (*p*-value) 0.99						
Obs. 175						
Countries 35						

innovations. Model (1) examined the effects of control variables on dependent variable. The results show that population and education development have positive and statistically significant influence on productive entrepreneurship. GDP growth and foreign direct investment are statistically insignificant suggesting that they have no influence on productive entrepreneurship.

Model (2) results provides for the influence of independent variables (eco-factors of entrepreneurial ecosystems) on productive entrepreneurship without the mediating

variable. Hypothesis 1 provides that eco-factors of entrepreneurial ecosystems have positive influence on productive entrepreneurship. The findings show that financial capital, institutional capital, knowledge capital and internal market dynamics and openness are statistically insignificant meaning that they have no influence on productive entrepreneurship. However social capital (supporting culture) found to have negative and statistically significant influence on productive entrepreneurship.

The findings in model (3) and (4) show the influence of independent variables (eco-factors of entrepreneurial ecosystems) on mediating variable-innovations (product and process innovations). The results show institutional capital through government entrepreneurial programmes and physical infrastructures have positive and statistically significant influence on product innovations. Furthermore, knowledge capital through research and development transfer has positive and statistically significant influence on product innovations.

Model (5) reports the findings on the influence of product and process innovations on productive entrepreneurship. The findings show that product and process innovations have positive and statistically significant influence on productive entrepreneurship. The results in model (6) provides support for the hypothesis that the influence of eco-factors of entrepreneurial ecosystems on productive entrepreneurship is mediated by innovations (product and process innovations). Combined results (model 6) show that eco-factors of entrepreneurial ecosystems are statistically insignificant while the product and process innovations as mediators are positive and statistically significant.

Discussion

The findings in model (2) reveal a weak and mixing direct effect of eco-factors on productive entrepreneurship without the mediation role of innovation. The findings show that almost half of eco-factors have positive or negative but insignificant influence on productive entrepreneurship. However, entrepreneurial culture found to have a significant but negative effect on productive entrepreneurship. Despite its importance in explaining disparities in entrepreneurship development among nations, entrepreneurial supporting culture still receives less attention among members of societies in many developing countries (Brownson, 2013). Unlike in developed economies (Mindaugas & Rasa, 2013), most of societal norms and values in developing economies do not embrace entrepreneurial behaviours and entrepreneurial success and failure stories (Castillo et al., 2017). These findings come in line with findings from the study of Corrente et al. (2019) who by using different analytical methods (SMAA and SMAA-S) analysed the correlation coefficients using Kendall tau test between the eco-factors and the eco-output (number of high growth startups) of European countries. Similarly, they found mixed effects (half of eco-factors found to have positive correlation with eco-output while others found to have negative correlation) while entrepreneurial culture, government programmes and internal market dynamics being most relevant factors.

Furthermore, the findings provide supporting evidence that the influence of eco-factors on productive entrepreneurship is mediated by innovations. The findings in model (6) show that product and process innovations have positive and statistically significant influence on productive entrepreneurship. This provides supporting evidence that entrepreneurial ecosystems foster productive entrepreneurship through innovations (Hullova

et al., 2019). As argued by Scuotto et al. (2019) and Sussan and Acs (2017) vibrant entrepreneurial ecosystems are houses for innovative startup firms. The findings suggest that African entrepreneurial ecosystems promote innovation performance mainly through entrepreneurial oriented government programmes, infrastructures, knowledge capital through research and development activities, as well internal market dynamics. Improved innovations (in terms of product and service innovations) in turn foster productive entrepreneurship. The increased magnitudes of coefficients of product and process innovations reveal the presence of complete mediation effects of innovations on the causal effect relationship between eco-factors of entrepreneurial ecosystems and productive entrepreneurship.

Conclusion

This article aims at examining the potential mediation effects of innovations on the causal relationship between eco-factors of entrepreneurial ecosystems and productive entrepreneurship. Several extant studies on entrepreneurial ecosystem research focus on identifying relevant supporting elements for successful and vibrant entrepreneurial ecosystems. However, less has been done to provide empirical evidence of the causal relationship between eco-factors and eco-output of entrepreneurial ecosystems.

The panel regression (random effects) results provide less support evidence for the direct influence of eco-factors of entrepreneurial ecosystems on productive entrepreneurship in developing economies. Financial capital, institutional capital, knowledge capital and internal market dynamics and openness found to have no direct influence on productive entrepreneurship. Social capital through entrepreneurial supporting culture found to have negative and significant direct influence on productive entrepreneurship. This is because societal norms and values in most developing countries are still reluctant in embracing entrepreneurial behaviours (Adler & Kwon, 2002; Castillo et al., 2017). However, this article finds complete mediation effects of product and process innovations on the causal relationship between eco-factors and eco-output of entrepreneurial ecosystems. Conducive and quality entrepreneurial ecosystems provide necessary inputs that foster innovations which in turn promotes productive entrepreneurship (Scuotto et al., 2019; Sussan & Acs, 2017).

Theoretical and practical implications

The study contributes towards the theoretical and empirical gap and extends the existing conceptual model on eco-factors and eco-output of entrepreneurial ecosystem by providing statistical evidence on the mediating role played by innovations. The findings reveal that entrepreneurial ecosystems can foster innovation performance by providing entrepreneurs with necessary resources such as government supports (e.g. customized entrepreneurial programmes and infrastructures); knowledge capital in terms of research and development activities as well internal market dynamics which in turn improves their entrepreneurial performance. In addition, the findings inform the policymakers and practitioners that designed policies and programmes fostering quality of entrepreneurial environments (ecosystems) and entrepreneurship must be more customized focusing on improving the innovative capacity of entrepreneurs and their related startups.

Limitations and area for further research

This study encounters some limitations. The analysis is based on GEM database which is compiled based on views of some selected country representatives on the quality and depth of entrepreneurial ecosystems at the national level. This may suffer from implicit biasness due to subjectivity among those experts. Thus, future research can focus on micro-level data analysis, as suggested by Malecki (2018) that the local perspective provides rich information about entrepreneurial ecosystems. Entrepreneurial ecosystems are good habitat for innovative entrepreneurs, future research could also explore challenges these entrepreneurs encounter in acquiring, utilizing and managing internal and external knowledge during designing and implementing innovative products and services. Future research could further explore how collaborations among different industries within the entrepreneurial ecosystem can moderate the effect of innovations on productive entrepreneurship.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendices

Appendix 1. Variance Inflation Factor (VIF) results for multicollinearity test

Variable	VIF	1/VIF
Finance	2.87	0.348
Gvt-Entrep as (Econ Agenda)	3.56	0.281
Gvt (Tax and Bureaucracy)	2.54	0.393
Gvt (Entrep Programs)	4.43	0.225
Know Capital (BSEEDT)	2.91	0.344
Know Capital (PSEEDT)	2.36	0.424
Know Capital (R&D)	4.27	0.234
Entre Support Services	2.37	0.423
Internal Market Dynamics	1.87	0.534
Internal Market Openness	3.51	0.285
Physical Infrastructures	1.63	0.615
Entrepreneurial Culture	1.81	0.553
Product Innovation	1.35	0.739
Process Innovation	1.31	0.762
Pop	2.59	0.387
Edu	2.32	0.431
GDP growth rate	1.12	0.897
FDI	1.1	0.905
Mean VIF	2.44	

Appendix 2. Linktest results for model specification test.

Productive Entrep	Coef.	Std. Err.	*t*	*P* > t	[95% Conf. Interval]	
_hat	1.088	0.524	2.07	0.040	0.053	2.123
_hatsq	−0.002	0.011	−0.17	0.866	−0.023	0.020
_cons	−0.987	6.071	−0.16	0.871	−12.970	10.995
Obs	175					
F (2, 172)	91.61					
Prob > F	0.000					
R-squared	0.516					
Adj *R*-squared	0.51					