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To cite this article: Pascal Samfoga Doh, Jussi S. Jauhiainen & Rosemond Boohene (2021): The synergistic role of academic entrepreneurship patterns in entrepreneurial university transformation: Analysis across three African sub-regions, African Journal of Science, Technology, Innovation and Development, DOI: [10.1080/20421338.2021.1943815](https://doi.org/10.1080/20421338.2021.1943815)

To link to this article: <https://doi.org/10.1080/20421338.2021.1943815>



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Published online: 30 Jul 2021.



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The synergistic role of academic entrepreneurship patterns in entrepreneurial university transformation: Analysis across three African sub-regions

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This study set out to establish entrepreneurship patterns in selected African universities and examine their potentials for institutional entrepreneurial transformation. The idea of the synergistic potential of entrepreneurship patterns with entrepreneurial university (EPU) concept influenced us. Our institutional sample comprised eight universities from three African sub-regions. We undertook document reviews, conducted forty-nine interviews and used content analysis. We found and established nine patterns, designed a holistic framework for the patterns and analyzed the dynamics and potentials. This synergistic approach, which is still marginal in the EPU literature, seemed truly relevant in the studied developing countries. Rather than borrowing pathways, the holistic framework addresses more effectively the different governance systems, meanings, resource mobilization processes, development contexts and business practices around the African universities. The framework constitutes a mirror, drawing board and director of attention and awareness for planning, analysis, review and funding of entrepreneurship in the studied countries. The article has practical implications for university managers who have the role to stimulate institution-wide entrepreneurship and make strategic choices. The article provides clear theoretical input to the higher education management literature, especially entrepreneurship management in developing countries which do not possess the institutional characteristics that have led to EPUs in higher-income countries.

Keywords: university, entrepreneurship, patterns, potentials, entrepreneurial university, Africa

Introduction

The entrepreneurial university (EPU) concept is increasingly gaining worldwide prominence as a key type of institution in knowledge-based societies. EPUs respond effectively to the third – entrepreneurial – mission of universities. According to Clark (1998), EPUs break out of outdated traditions and constraints of state-directed top-down higher education (HE) systems and funding regimes (Clark 1998, 2004). EPUs possess a capacity for change. They build a wide range of innovative for-profit activities in their ecosystems. According to Etzkowitz (2004), the EPU signifies a second revolution to a third mission of economic development and commercial potential of university research (Etzkowitz 2004; Etzkowitz and Zhou 2008). EPUs are directly involved in technology transfer, enterprise formation and regional development. They stimulate and support the development of entrepreneurial mindsets and skills across the university (EC-OECD 2012). Such transformation obviously involves conflicts within universities since entrepreneurship is an extra mission with different cultures and values (see Philpott et al. 2011).

The EPU concept has been developing in high-income countries for close to three decades (Clark 2004; EC-OECD 2012; Kirby 2006; Sam and van der Sijde 2014). Increasingly, many developing countries' universities, including in Africa, express a strong interest in the concept because of the economic development implications and income generation purposes. Many EPU reviews and studies today focus on developing countries.

Many are adopting the European Commission Guiding Framework for Entrepreneurial Universities (EC-OECD 2012) for review of their universities. The EPU is perceived to overcome the financial austerity faced by African universities amidst massification, quality concerns, weak institutional capacities and the mismatch between industrial demands and student supply (Oketch 2016). EPUs are perceived to enhance universities' impact on economic development. Some scholars believe strongly that developing countries need EPUs (Bizri et al. 2019; Doh 2012; Etzkowitz and Zhou 2008). In fact, African universities are today expected to be key institutions in poverty reduction (Doh 2012).

This article set out to scrutinize common structural and cultural patterns of university entrepreneurship in some African universities. The idea about the synergistic potential of entrepreneurship patterns with the EPU concept influenced us (Gibb 2012). Our main research question is: How do the universities and related systems' actors interpret their different practices and structures of entrepreneurship? This is accompanied by two sub-questions: How institutionally entrepreneurial are the universities? And: What potentials do the existing entrepreneurship patterns present for institutional entrepreneurial transformation?

The objective was to establish the state-of-the-art of entrepreneurship patterns and practices in the selected African university systems. University actors are usually unaware of such patterns (Malele, Mpofu, and Muchie 2019), whereas connecting (synergizing) the patterns

into an organization-wide plan, institutional concept and strategy can render the university more entrepreneurial (Gibb 2012). Entrepreneurial transformation of universities is taking place at different levels everywhere (Bizri et al. 2019). However, existing pockets of entrepreneurship and enterprising activities everywhere do not yet make the university entrepreneurial (Gibb 2012). In the study, we identify the patterns of entrepreneurship, analyze the dynamics of each, the degree to which each pattern is embedded institutionally and examine prospects to transform more entrepreneurially. Recent emerging studies on university entrepreneurial transformation in Africa are limited and usually based on single institutions or country cases (Baporikar 2019; Doh 2012; Mudde et al. 2019; Mutanda, Lekhanya, and Moyo 2018). The study covered universities in three of the five-macro regions of Africa, across sectors in the Anglophone and Francophone systems. The article presents a generalized pattern, facilitating analyses on institutional-systemic differences, synergies and complementarities to spur EPU in Africa. The next section presents the theoretical background of the study followed by methods, the findings, and analysis of the missing links with the EPU concepts, potentials and conclusions.

Theoretical background

Earlier studies on EPU seem to lack a strong or steady theoretical basis. The EPU concept continues to widen to diverse disciplines. These include, for instance, the stakeholder and configuration theories (Clauss, Moussa, and Kesting 2018), agency theory (Gianiodis, Markman, and Panagopoulos 2016), neo-institutional theories, institutional economics theory, public-private partnership and new public-management theories (Salamzadeh et al. 2015). Other scholars simply generate alternative models, archetypes and taxonomies related to EPU (Bronstein and Reihlen 2014). In addition, entrepreneurship seems to have emerged in parallel with the EPU concept, the ‘entrepreneurial university’ mostly seen as an institutional concept based on certain institutional characteristics (e.g., Clark 1998, 2004 as per Finlay 2004).

In this study, we found the relevance of entrepreneurship and intrapreneurship theories in analyzing the entrepreneurship patterns in Africa. This includes, for instance, cognitive models of entrepreneurship based on the theories of planned behaviour (TPB) and intrapreneurship. The TPB by Ajzen (1991) sees behaviour as a function of behavioural intentions and control. Various authors extrapolated this theory to explore situations that lead to entrepreneurial behaviour. This suggests that individuals activate their entrepreneurial potentials if they believe they have the ability, the environment provides them opportunities, and there is social support for such entrepreneurial behaviour (Kirby 2006). In the context of the EPU, this means the need to address both the individual and organizational contexts within which entrepreneurship occurs.

Bostjan and Hisrich (2003) define intrapreneurship as emergent behavioural intentions, which depart from the customary ways of doing business in existing

organizations. Applying this to the EPU means a deviation from earlier academic activities to novel societally relevant and commercial outputs; how universities launch and implement entrepreneurial strategies. According to Grimaldi et al. (2011), university entrepreneurial strategies are influenced by many factors; government policies enacted by local, regional, national and supranational actors, the culture of individual universities and their sub-units, individual campus leadership, the quality of the university, the resources and dynamism of local economy and capabilities to transfer knowledge and technology.

Drawn on the above-mentioned two traditions, EPU are also propelled by the motivation of staff in identifying new ways of doing business and the belief that they can bring about innovative changes. As indicated by Franklin, Wright, and Lockett (2001), universities have two options when they formulate entrepreneurial policies such as start-ups. They can either encourage faculty members to engage in these activities or use external entrepreneurs to assume a leadership role. Nevertheless, the university’s capabilities to initiate and promote venture-creation processes is crucial in the formation of university spin-offs (Rasmussen and Borch 2010). Kirby (2006) also noted that the TPB and intrapreneurship could be widely used to explain the entrepreneurship patterns and behaviour of universities. Despite its UK (Western) context and examples, Gibb’s conception is simple to interpret and operationalize in the studied African countries. Gibb (2012) suggests the identification of such entrepreneurship patterns, examining and establishing the synergies and potentials of how these patterns and activities reinforce and embed entrepreneurship into a wide organizational strategy, the Entrepreneurial University concept.

Africa and the entrepreneurial university concept

Clark (1998) conducted a highly heralded study providing five pathways of how five European universities became entrepreneurial. He then extended the same study outside Europe, including one African University (Clark 2004). Subsequent studies stressed the importance of academic staff, administrators, students, new ventures and existing firms in EPU (Etzkowitz 2004; Glassman et al. 2003). Gibb (2012) sees the importance of the ‘entrepreneurial’ and ‘enterprising’ activities.

Many researchers suggest the globalization of the EPU as a means to solve the financial austerity facing universities (Pinheiro and Stensaker 2014). Thus, various countries are undertaking reforms to increase the commercialization of the research results by setting up technology transfer offices (TTOs), incubators, entrepreneurship centres, and internal seed funds (Rasmussen and Borch 2010). In general, the commercialization of knowledge and research generated by universities has become globally common (Grimaldi et al. 2011). Guerrero and Urbano (2012) argued that if an entrepreneurial society refers to places where knowledge-based entrepreneurship has emerged, then EPU play important roles as knowledge producers and disseminating institutions. Later studies suggest that EPU are shaped by the geographic, innovation or entrepreneurship

ecosystems (De Jager et al. 2017; Gianiodis, Markman, and Panagopoulos 2016). However, the literature still has substantial gaps. Most have been built on successful cases in the high-income countries. In addition, the geographic, economic and educational contexts behind EPU are rarely addressed in depth (Rhoads and Stensaker 2017). Etzkowitz's triple-helix model of university-industry-government interaction, for instance, falls short of addressing the dominant situations of developing countries, where the structure of the economies is dominantly informal, and comprised of small business and enterprises (Doh 2012). Very few studies have linked EPU with graduate employment, job creation and poverty reduction.

EPU research is increasingly focusing on developing countries (Bizri et al. 2019; Dalmarco, Hulsink, and Blois 2018; Fischer et al. 2019; Guerrero and Urbano 2012; Klofsten et al. 2019; Sultan 2017). However, majority has been prescriptively limited to the roles (impacts) of EPU. Other systematic studies in Africa that come close to the EPU literature mostly address the engaged university (Mtawa, Fongwa'a, and Wangenge-Ouma 2016; van Schalkwyk and De Langue 2018) and the role of universities in economic development (Cloete, Bailey, and Maassen 2011; Muller, Cloete, and van Schalkwyks 2016). Most have focused on student and staff entrepreneurship (Akinwale 2015; Amadi-Echendu, Chodokufa, and Visser 2016; Malele, Mpofo, and Muchie 2019; Mutanda, Lekhanya, and Moyo 2018), often describing single-country or single-university cases. One of such that inspired this article is Doh's (2012), which studies perceptions about entrepreneurship in Cameroonian universities, using the five pathways of Clark (1998). This article expands the research scope by establishing common patterns across the regions in Africa.

Methods

This study was qualitative, based on case study and theory-driven approaches. The case study approach is used to identify the country and institutional cases, the theory-driven approach, to interpret and connect the patterns and practices to conceptual frameworks in the literature. This facilitates conclusions on the prospects and potentials of the patterns. As noted by Crow et al. (2011, 1), the case study approach is 'particularly useful when there is a need to obtain an in-depth appreciation of an issue, event or phenomenon of interest in its natural real-life context.' While performing the case study method, it was important to bear in mind the necessity to generalize from limited number of cases (Yin 2014). Without this, selecting universities from a big African continent with several hundreds of universities would have been particularly challenging. The lack of statistics, diversity and typologies exacerbated this challenge. Consequently, we implemented an interpretive and purposive selection technique (Mason 1996; Silverman 2005). By these, we first referred to literature on EPU and those concerning African universities. Then we conducted pilot interviews with key experts in HE management conversant with the EPU concept and the

African university landscape. Uganda (as per Clark 2004), Ghana, Kenya and South Africa were often mentioned. Cloete, Bailey, and Maassen (2011) use countries' positions in knowledge economic rankings to label some of the major early universities of the above countries as Africa's flagship universities that have been crucial in the continents' human resources and knowledge economic development. Such African universities are likely to be key actors in stimulating the countries' entrepreneurial societies. Scholars (Etzkowitz and Zhou 2008; Klofsten et al. 2019) make this connection between economic development and the EPU concept.

Observing that Cloete, Bailey, and Maassen (2011) and many African studies on these economic development-entrepreneurship issues omit the twenty-two Francophone African countries, we included linguistic and regional balance in our criteria. This suggested selection from different macro-regions. After performing the above steps, we chose Ghana and Uganda, which were recurrent in most criteria. Cameroon reoccurred to a lesser extent, but we added it because of its Francophone and Anglophone education systems and location between two sub-regions, Central and West Africa. Many South African universities were so frequently mentioned that we eliminated them from the sample. Nevertheless, we refer to universities in other African countries (when appropriate).

For institutional choices, we focused on legitimacy and diversity, selecting both renowned and the (younger) struggling institutions (see Rhoads and Stensaker 2017). Here, we emphasized generational difference and typology. The most renowned (therefore flagship) universities were University of Ghana (UG) and Makerere University (MU), Uganda. Since the notion of African flagship universities coincided with the pioneer (pre- or early post-independence) universities (see Cloete, Bailey, and Maassen 2011), we included the University of Yaoundé I, Cameroon from Francophone Africa. We then selected other public universities of the late 1980s and early 90s (UCC the exception) and two Universities of Science and Technology. Many of the countries' private universities were either current or former mentees, hybrids or foreign branch campuses and replications thereof.

Afterwards we verified the rankings of the chosen universities to establish their performance varieties. Several (e.g., Ranking Web University, Unirank, Time Higher Education and African University Ranking) had such varied criteria that we dropped ranking as part of our performance analysis. Nevertheless, the rankings enabled us to obtain a first clue on the statuses and, to some extent, popularity of some of the universities. Some of the ranking data corresponded with the primary sources. The chosen universities are, according to Unirank (2020), amongst the 1225 officially recognized institutions in Africa (<https://www.4icu.org/Africa/>). They are also amongst 200 ranked African universities. Afterwards, we collected the universities' basic performance measurement (PM) statistics (Higgins 1989) such as student enrolment, number of faculty staff, budget (input) and number of graduates, PhD graduates and research (output), as shown in Table 1.

Table 1: Status and performance variety of the studied African universities.

Institution	Country	Year established	Language/system	Student no.	Budget (USD) from original currencies	Teaching staff	Graduates	PhD/Year
University of Buea (UB)	Cameroon	1993	English	18,083	25.7 m\$	443	2427	23
University of Douala (UD)	Cameroon	1993	French	51,378	27.65 m\$	754	11,370	98
University of Yaounde 1 (UY1)	Cameroon	1962	French	53,169	25.3 m\$	1255	7574	80
University of Ghana (UG)	Ghana	1948	English	44,795	173.3 m\$	1,908	9,283	143
University of Cape Coast (UCC)	Ghana	1962	English	35,922	107.3 m\$	815	2415	92
Kwame Nkrumah University of S & T (KNUST)	Ghana	1952	English	64,187	94.3 m\$	3000	NP	NP
Makerere University	Uganda	1922	English	34,696	86.9 m\$	1492	14,085	70
Mbarara University of S & T (MUST)	Uganda	1989	English	3,163	43.5 m\$	42	1031	11

Sources: All three Cameroonian universities: ‘*Annuaire Statistiques*’ MINESUP (2018)/ Central Annual Statistical report of higher education compiled from Universities: Ghana & Ugandan Universities: Annual Reports, Publications Directorate of Research, Public Relations Offices, Consolidated financial reports & Facts sheets & Facts and Figures sections of website (2015–2020). Websites of all the Universities.

We ended with statistics of doctoral graduates due to lack of a uniform reporting approach by the universities – different choices (some focus on citation impact, publications, many on research income streams and partnerships, cases of under-documented figures), different generation universities and institutional typologies. In short, challenges of quantifying all the quantifiable and quality aspects are typical of performance measurement even in the most sophisticated systems (Jaaskelainen, Lonnqvist, and Kulmala 2007), which was not our main objective. The interviews complemented the research-based aspects of the entrepreneurial analysis. Interviewees often orientated us to relevant statistics, where necessary.

Forty-two semi-structured interviews were conducted with multilevel officials and staff, lasting 35–50 min. Of the interviews, 18 were from distance through phones, Skype and WhatsApp. We had 24 face-to-face interviews during field visits we made. One co-author is permanently resident in a studied country. In total, 49 interviewees participated in the study: institutional administrators (15), academic staff and project coordinators (19), selected excellent student innovators-entrepreneurs (8) and the international experts (7). Here, we applied Gibb’s (2012) conception and the theoretical framework on the need to address the individual and the organizational contexts, importance of academic staff, administrators, students, new ventures and existing firms. We also used the earlier pilot interviews and literature review to determine specific themes in the interviews. During these interviews, we focused on perceptions, activities and structures at each level. Besides specific questions, three questions that ran through all interviews were on participants’ knowledge of the different patterns of entrepreneurship in their universities and dynamics: concrete entrepreneurship activities and, third, changes towards a more institutional entrepreneurial orientation in their

countries, universities, units. The Principal Officers mostly discussed institutional strategies towards entrepreneurship, providing examples of flagship initiatives in their universities, other staff, and their units.

We triangulated the several sources of information: pilot interviews, official university documents and staff interviews. The reviewed official documents included strategic plans, annual reports, and factsheets, budget books, streams of external income and memoranda of understanding (MoU). Some official documents were available on the universities’ websites. We then undertook a content analysis of the documents and interviews and categorized the emerging themes. We concluded with nine structural and cultural patterns, which we labelled. The label names of some patterns were deduced from the interviewees’ descriptions. We adopted some of the names or labels of the patterns word verbatim from the interviewees. In fact, one or two of the patterns had been echoed in the previous study (Doh 2012). Where the interviewees’ descriptions and explanations corresponded to an existing literature concept or name, we adopted the literature concept-name and described the dynamics in the African context. The dynamics of each pattern are discussed hereafter.

Findings

Figure 1 presents a holistic picture of the nine identified patterns of entrepreneurial transformation in the selected universities in Africa. Two patterns exist at the system level: a more applied economically interactive subsector labelled as ‘implied’ entrepreneurial universities and the comprehensive (mass) universities. Three structural patterns exist at the university levels: specialized entrepreneurial establishments, entrepreneurial centres, peripheries and islands. Four patterns exist at the basic units: researcher-led, teacher-centred, student-centred and student-led entrepreneurship.

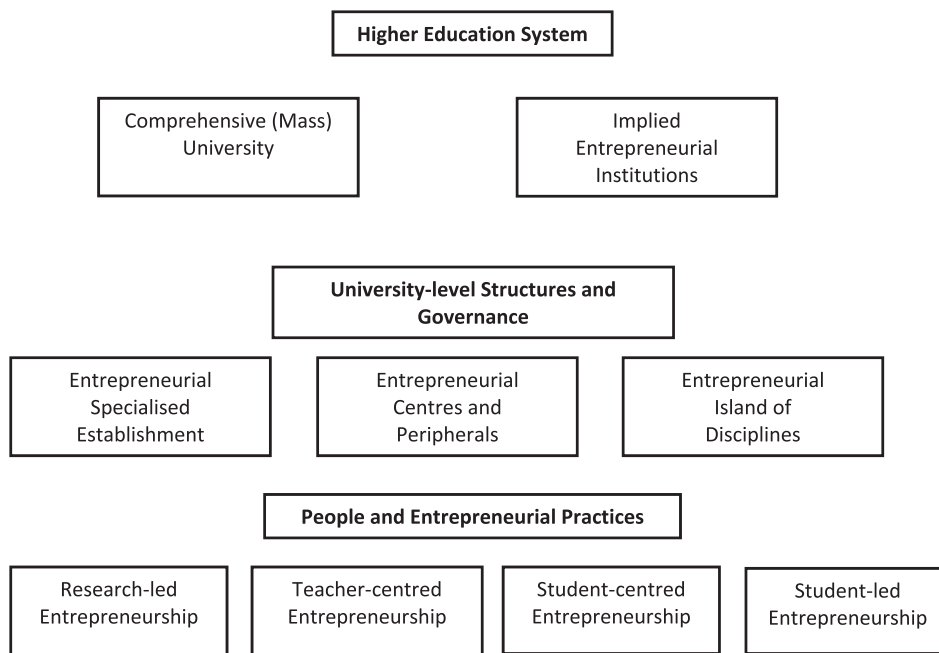


Figure 1: Structural and cultural patterns of entrepreneurship in Africa.

1. *'Implied' entrepreneurial institutions*

By the implied entrepreneurial institutions (right, level 1, Figure 1), we refer to universities in Africa that are relatively entrepreneurial than the dominant traditional comprehensive universities because of their more applied nature. Drawn on our interviews, nearly 95 percent of interviewees in the English-speaking African universities and countries expressed the belief that the EPU concept is a domain of certain applied institutions. A few who doubled as Ministry Administrators in our studied countries said it is a policy determination to have a more applied sector, and this would possibly lead to more (entrepreneurial) universities. In fact, this perception has led to the formation of the Commonwealth Association of Technical Universities and Polytechnics in Africa (CAPA) to promote these 'implicit' entrepreneurial institutions. Here we distinguished two categories, the technical-techno and research-based technical-techno types institutions as below:

Technical-techno type institutions

These are postsecondary institutions mostly offering technical and vocational training. All interviewees, especially those from the two English-speaking African countries, confirmed they are very interactive with industries and have a peculiar non-government income-generation culture and high graduate employment rates. They generally orient towards employment-relevant knowledge, skills acquisition and applied societal problem solving. Most in this first category do not conduct research. They often develop their curricula in partnership with industries. They are prone to an institutionalized management style, often emphasizing leadership training and skills development for wealth creation. They are sustained with resources generated from industries and applied

programmes. Some in this category operate their own companies, coordinating the use of their expertise for the industrial and socio-economic development. A cited Dar es Salaam Institute of Technology (DSIT) (though not one of our case study) is an outstanding example. It is a limited company engaged in construction and civil, electronic, telecommunication and other industrial works in Tanzania. These techno type institutions are also important incubating institutions for talented entrepreneurs and technology developers. Their ability to train technology-minded and highly employable graduates are important assets and reputation.

- Research-based technical-techno types.

These are full-fledged, often universities of science and technology in the English-Speaking African countries which distinguish themselves from the above-mentioned broad category of universities because they conduct research. The Kwame Nkrumah University of Science and Technology (KNUST), Ghana, in our studied group (amongst others such as in Nigeria, South Africa, Kenya, Namibia, and Egypt) is an outstanding example. Our interviewees claim that KNUST is comparable to many EPUs in industrialized countries. At the time of the study, one of its flagship innovations was a solar-powered four-by-four-wheel drive vehicle. KNUST has an atypical system of fast leadership, a well-streamlined governance structure and a strong university-industry engagement. The Kumasi Business Incubation Centre at KNUST is the leader of business incubation in Ghana. KNUST is said to raise substantial financial resources for its outreach activities; it has latitude and discretion in its budgets and subsidizes other programmes.

KNUST has several support programmes for young students with business ideas. It organizes various mentorship and support programmes, which attract private-sector experts. The interviewees revealed that these initiatives

have led to an increase in entrepreneurship and student employment. KNUST demonstrates a strong combination of applied and research agendas with industrial entrepreneurship. Private companies sponsor its research chairs. For instance, the Ghana National Petroleum Corporation sponsors the research chair in Petroleum Engineering. KNUST has developed a robust intellectual-property regulation, including a master's programme in intellectual property to build a critical mass of experts in intellectual property rights for Ghana.

- The comprehensive universities

The entrepreneurial orientation is also changing the locus of governance in the traditional-comprehensive universities. Here, the mission, vision statements and even core functions are being modified to statements such as 'innovation', 'business', 'and knowledge transfer', 'enterprising.' For example, Makerere University-MU (Uganda) recently added the statement of becoming 'leading institution in innovation.' We also found a trend towards decentralization and autonomy. In 2011 and 2014/2015, respectively, MU and UG adopted a collegiate system (KNUST earlier in 2005, UCC), which decentralized and devolved more autonomy to the colleges. The respective principal officers revealed that decision-making processes in a previous faculty-based system had been constrained by too many layers and a dysfunctional committee system. Interviewed officials at the University of Douala (UD), Cameroon, believe that streamlining the decision-making structures is important because 'business operators do not have time [to wait] for ideas to go through the many decision-making instances of the university.' Consequently, the university has given more autonomy to its operational units. A senior administrator of the University of Buea (UB) observed that, nowadays, councils and senates mostly meet to 'vet' decisions made in the lower levels.

One of MU's strategic goal as per respondents, is to run the university as an enterprise while synchronizing with the government plans and policies. There is also an observed trend to add 'innovation' or 'business' function to research. Around 2010–2011, University of Ghana (UG) created an institution-wide structure known as Office of Research Innovation and Development (ORID). Similarly, in 2007, the Vice-Rectorate for research was renamed Vice-Rector for Research, Cooperation and Relations with the Business World in Cameroonian state universities. In addition to different entrepreneurship centres, multiple non-traditional and interface units composed of university actors and economic operators exist in Cameroonian universities to orientate programme development with economic operators. Recently, MU created a Knowledge Transfer for service delivery to the different districts in Uganda.

Many of the universities were also seen designing strategies towards a sustainable financial basis from non-government sources. A Makerere Endowment Fund (MEK) was recently created to mobilize international and local funds (World Bank 2014). MU's 2016 Annual Report indicates that the offshore funds grew by over 13% and the local funds by over 4% in 2016. The second is the

Makerere University Holding Company to address investment initiatives. Both are meant to counter the university's stringent fee policy, which has become a source of constant student unrest. Despite the public status, the percentage of UG's budget from private and third-party income has increased by about 35%. University of Douala estimates that over half (52%) of its budget is from nongovernmental sources (Doh 2012).

International partnership-based scholarship schemes, such as at MU (Uganda) and UG (Ghana) constitute significant alternative income sources. UG had over 83 partnerships with 27 countries – with students, scholars and collaborators from over 60 countries. MU, for instance, documented in 2015/2016 a very significant number (36) MoUs, annually, with diverse global partners, coinciding with the number of registered income streams from 36 long-term and continuing international partners (Annual Report 2016, 45–46, 65). One can observe the African comprehensive (more research-oriented) institutions expressing a peculiar dimension of Gibb's (2012) internationalization, notably the importance of global circulating capital whereby their entrepreneurial orientations relate to their abilities to build partnerships and access international funds. The related partnership capacity skills are important assets in the global context in which higher education operates but, equally, presents several downsides.

- Specialized Entrepreneurial Establishments (*établissement*)

Whereas the preceding analysis and patterns pertain to the whole university, an increasingly dual or binary system to obtain more specialized entrepreneurial institutions in Anglophone Africa, Cameroon is representative of how Francophone African universities rely on certain corporate establishments within universities to be entrepreneurial. However, the increasing adoption, such as in Ghana, may justify this typical Francophone model.

Following our interview about the EPU concept, the increasing entrepreneurship and entrepreneurial transformation of universities, nearly all participants in the French-speaking universities expressed the EPU as a function of certain applied establishments in universities. They referred to it as *établissement*, a traditional French-system corporate (faculty-like) structures covering several disciplines within universities. Here, in Francophone Africa, the *Institut Universitaire de Technologie* (IUT) (University Institutes of Technology) dominate in a category of applied and more entrepreneurial *établissements*. Their greatest assets and reputation are higher graduate employment and stronger links with industries and development actors. Traditionally, IUTs mostly offered short, two-year certificate (called *Diplôme Universitaire de Technologie, Brevet de Technicien Supérieur*), but, today, they offer up to postgraduate degrees in direct employment-relevant programmes (e.g., electrical, industrial, civil, computer, maintenance, software and mechanical engineering). Their programmes are often designed in partnership with industries. They have a relatively strong applied and internship-based training, involving student and teacher mobility between the industry and the

university. They are oriented to develop new applications and technology products for the markets.

In 2018, the flagship technologies at IUT, University of Douala (UD), included a self-rechargeable ventilator powered by electric or solar energy, a densifier for splitting plastic materials and a miniature hydraulic turbine for electricity in rural areas. Other ministries are strongly involved in the IUT. For instance, the Cameroon Ministry of Mines, Industry and Technological Developments financed prototypes of the mentioned products. UD organizes an annual Coffee Debate for Directors of Human Resources to exchange on company training needs, a Science and Technology Week and 'University and City Development Program', which brings together companies and other development actors.

The IUTs follow the French applied establishments (*Grandes Ecoles*-Advanced Schools) such as Polytechnic, which historically dominated French HE structures (Doh and Samfoga-Doh 2016; Leroux 2014). These also exist within universities, but respond to broader national assignments. Many increasingly conduct research. Interviewees at the National Advanced Polytechnic School (NAPS), University of Yaoundé 1 (UY), Cameroon, observed that it has developed sufficient income generation capacity that could subsidize up to 30% of the university's budget.

The University of Ghana (UG) exhibits a pattern of specialized entrepreneurial establishments. Here, a particular establishment is mandated to mobilize and coordinate most of the university's direct economic development and knowledge transfer activities, university-wide activities involving industries. This conceptualization accounts for the creation of the Institute of Applied Sciences and Technology (IAST) in 2012 as a platform and clearinghouse for the transfer of knowledge, technology and commercial activities from the university to various industries (University of Ghana 2012). The IAST organizes most of the country's academia-industry events and displays technologies that various departments and units have developed. It is also in charge of environmental and industrial needs assessments.

According to interviewees, this method of organizing the universities' applied activities has yielded significant results. Since its creation, the IAST has established several externally funded partnerships with local and international companies to promote contract research, secure student internships, develop products and build capacity. It has also received funding from many industries. The scope of these entrepreneurial-applied activities has also increased at a national level. The IAST hosts Ghana's Economic Inclusion and Poverty Eradication Project, a 20-year well-being programme that seeks to eradicate poverty in Ghana. It is also a leading establishment for knowledge transfer to the agricultural sector towards nationwide food sufficiency.

- Entrepreneurial islands

Contrary to the preceding pattern covering several applied disciplines, this is a single discipline pattern, prominent in the studied universities. During the interviews, participants often referred to certain disciplines animating entrepreneurship in their universities. Drawn on the literature,

this depicts an 'entrepreneurial island', where some universities typically capitalize on certain programmes with higher propensity to drive the university as entrepreneurial, concentrating funding and launching more ventures in some programmes and laboratories (Azele, Meyer, and Pottelsbeghe 2008). This was said to be realistic and traditional because some disciplines are generally more applied and market-oriented and could, at times, attract more attention. In the referenced developed country's case, almost half of entrepreneurship activities were concentrated in the life sciences, most active spin offs coming from biotechnology (Azele, Meyer, and Pottelsbeghe 2008, 673–674).

This island pattern is buttressed by a recent creation of discipline-based centres of excellence by the World Bank across Africa, which many of our studied universities (UG, KNUST, MU, and UY1) host (World Bank 2014). Besides, many national centres of excellence are created around certain disciplines that speed certain developmental objectives, attracting relatively more resources and attention. It is early to estimate the entrepreneurial abilities of the programmes, such as the World Bank's, because entrepreneurialism is not usually the explicit objective. However, some interviews revealed those such as an Information and Communication Technology (ICT), University of Yaoundé 1 (Cameroon) already raise significant external funding.

- Entrepreneurial centres and peripheries

All the studied universities possess some forms of entrepreneurship development and incubation centres. These were generally explained as structures to 'foster students' employment, enterprise creation capabilities, talent development, reduce unemployment and poverty and generally ensure economic growth.' These centres promote business, innovation and various creative ideas – in general, 'the nurturing of innovation and business ideas.' (Interviewee). Some are central, serving university-wide entrepreneurship functions, while others are attached peripherally to faculties or departments. In addition are business and consultancy units to 'promote business incubation, innovation, mentorship and entrepreneurship training' (Interviewee). The University of Cape Coast, Ghana, in our case group, recently set up a Centre for Entrepreneurship and Small Enterprise Development as part of a collaboration with a German university. Similarly, there is an Employment and Poverty Reduction Incubator at UYI, Cameroon. The studied universities showed a trend to offer university-wide entrepreneurship courses to students and (to a limited extent) teachers through these centres. The KNUST centre, Ghana, was observed to animate several national entrepreneurship activities, business clinics, graduates and continuing education programmes. The IAST's Careers and Counselling Centre at UG provides students opportunities to develop ideas, offers coaching and helps promote and nurture innovative business ideas.

- Researcher-led entrepreneurship

Researcher-led entrepreneurship describes the studied universities' abilities to win research and other project

grants from external sources, international foundations and, to some extent, industries and other local organizations. During the interviews, research funds attracted by academics were often cited to constitute an important third-stream budget ‘supporting acquisition of new infrastructures and recruitment of graduates, researchers and support staff’ (Interviewee). For instance, as at 2014/2015, 5% of University of Buea (UB)’s budget came from international grants (UB Budget Book). In 2015/2016, as per the annual report, that of UG was USD 25 million. Requesting to understand the prominence of this pattern, many interviewees observed that this researcher-led pattern is crucial for the university’s knowledge generation and dissemination. According to MU’s interviewees, it keeps the university afloat in the national policy domain but also defines the university’s international thrust.

According to the Cameroonian interviewees, several researcher-led income streams is an indicator of academic excellence because ‘these grants are usually gained through international competition.’ Referring to the factors promoting this researcher-led pattern, many interviewees pointed to the increasing effects of research- and project-based structures, such as the ORID at UG, ICT as main facilitator and increased capacity building for grant writing among academic staff. An increase in research capacity and staff qualifications and role of alumni were also cited. However, some interviewees expressed regret that African universities’ dependence on international research grants is ‘destroying the university.’ Others opposed that globalization has come to stay ‘therefore to access significant global capital is recognition that the university is doing a great job.’ Some stated that although the funding sources are international, they mostly address the countries’ developmental priorities.

Teacher-centred entrepreneurship

Interviewed teachers described their implementation efforts through the teaching-learning processes, often attributing successful students to some entrepreneurship courses or centres. A few interviewees used the term teacher-centred entrepreneurship, referring to all pedagogical and curricular processes to stimulate students to become more entrepreneurial. This involves ‘fostering teachers’ capacities to impart to students various entrepreneurship skills and competences, which facilitate employability, job maintenance and enterprise creation’ (Interviewee). Participants explained the importance of innovative and flexible pedagogical practices that ‘engage students to learn how to learn so that they can confront complex problems, using their own learning competences.’ Other respondents explained that it entails more entrepreneurial and creative teaching, ‘to blend theory with practice.’ All studied universities showed institutional consciousness on the absolute and broader need for teacher entrepreneurship training. They revealed that continental organizations, such as the Association of African Universities, have been active in organizing pedagogical and methodological courses to that effect, but it is still limited. Besides entrepreneurship-related teaching where students are the ultimate

focus, some of our studied universities also develop teachers’ capacities to build or operate the units or universities’ businesses.

• Student-centred entrepreneurship

Here, we identified and conceptualized a specific pattern and tendencies for the studied universities to focus some practices ‘entirely on students’ which we labelled as student-centred entrepreneurship. Interviews cite student incubation in entrepreneurship and innovation at different degrees in all the universities as the major form of this pattern. Also, internships, entrepreneurship courses and business-plan development have nearly become mandatory for all. UG operates an institution-wide pedagogy that puts a premium on experiential learning. UD dominantly operates a widespread practices of *stage académique* (on-the-job training). Meanwhile, UB requires all its students to undertake minor courses of their choice in applied disciplines. The emphasis focusing ‘entirely on students’ seemed intriguing since the student is central in higher education and entrepreneurship (Leroux 2014). Another curiosity was interviewees’ perception of this pattern as the most important in African entrepreneurial transformation. The study participants responded that it has direct connection to economic growth, ‘it easily boosts the economy and has a direct positive impact on tax revenues.

The distinction with the ‘teacher-focused’ pattern (above), when the ultimate aim and focus for all teachers is ‘students’ intrigued us also. Participants argued there are student-related elements beyond teaching. Some said students bring to the university entrepreneurship competences, experiences and motivation from different sources, ‘some of which could surpass the teachers.’ Many participants cited the influence of parent backgrounds, such as operating their parents’ businesses. They said such situations called for different ways, other than teaching to guide students. One respondent said, ‘In today’s world, teachers need more of coaching competences and not only teaching.’ Another remarked that entrepreneurship is not like any theoretical subject, ‘both parties [teacher and student] bring something on board.’ For example, ‘It is often said that entrepreneurship is also in the mind’ (Interviewee). Another interviewee exclaimed that elements such as industrial practices and internships may be institutional or systemic arrangements ‘but what the student brings along could be more important because he/she is object and focus.’ This called for the necessity to understand the limits of teaching. Many of our interviewed student-graduate entrepreneurs connected their success only to incubators and not to teachers or the university, at all. The above suggested understanding different areas of emphases and the need to provide ecosystems and environmental conditions for this important pattern to thrive.

• Student-led entrepreneurship

Many participants also distinguished a student-led dimension as the university’s capacity to manage and promote exceptional ‘elite’ cases where it is students leading an invention, animating the university’s entrepreneurship.

That is, circumstances where ‘entrepreneurship is the initiative or result of the students’ ingenuity.’ One interviewee expressed that, ‘if academics have failed in innovations, then we should try students.’ One reason is the awareness that some of the striking inventions and related entrepreneurship that humanity enjoys today (television, Google) emanated from students. However, this pattern was still to be institutionalized and mainstreamed in the studied universities; very few had a steady budget head for it. The latest start-ups at UCC were connected to its entrepreneurship incubator and to a business plan competition. At Tarkwa University of Mines and Technology, Ghana, three students had created a 3D printer, using materials from electronic waste. Another example was a Cardiopad (machine for diagnosing heart disease) in Cameroon. In Tanzania, a student at DSIT designed solar-power equipment to provide electricity to the houses in his grandmother’s village.

How entrepreneurial are the studied universities?

It is difficult to establish whether any of our studied universities qualify as an EPU because, first, the EPU means different things and has different priorities for different stakeholders (Pinheiro and Stensaker 2014). It is a relative and contextual concept. No standard definition and measurement criteria exist for EPUs across different contexts. The EPU concept embraces universities of all types; those with a strong research tradition, comprehensive universities and newer organizations.

What can be affirmed is the absence of highly knowledge-based, innovation-driven EPUs in our case studies. The common currency we found, especially for the comprehensive universities, is a dominant orientation towards a ‘developmentally-engaged university’, including being closer to the local communities. This could describe a new or returned type of university in Africa (UNESCO-UNECA 1962) with integrated organizational consciousness about the university’s developmental role; orienting teaching and research into outreach activities targeting national priorities. For instance, when asked about the respondents’ goals, activities and projects, nearly all the 42 (besides the 7 international experts) referred to certain national priorities or document they are addressing.

Besides external income generation, the aims and motives for the different patterns of entrepreneurship do not link the university actively to knowledge economic development. Even the divergent perceptions, several pockets and patterns of entrepreneurship suggest that the entrepreneurship is not fully institutionalized or embedded. For instance, asking about participants’ understanding or perceptions about EPUs, many respondents narrowed it to the income-generation-enterprising dimensions. Where some participants project the economic development dimension, it is limited to graduate employability or certain links of units with industries.

Perhaps what interestingly justifies the importance of the holistic framework with the nine patterns in Figure 1 (though we cannot claim it is exhaustive) is the general lack of an institutional picture of the different patterns, witnessed in almost all the interviews. For instance,

most of the interviewed institutional managers refer to entrepreneurship activities in their universities and their originating units but demonstrate limited systematic approach and categories from the institutional perspective, the lack of an institutional overview or a majority. In addition, most of the universities lack strategy documents to stimulate entrepreneurship broadly, such as covering the different patterns or choices. The basic unit actors talk of the teacher-student patterns within the black boxes of their departments or faculties. The lack of a framework and documented knowledge of the related dynamics, absence of systematic approach for institution-wide engagement could, indeed, question how and on what basis the universities stimulate or fund entrepreneurship. Consequently, entrepreneurship in the studied universities mostly occurs in an ad-hoc and unplanned manner.

Generally, the entrepreneurship and innovation ecosystem that stimulates the transformation of universities is weak. The transformation processes are generally aimed at graduate employability, entrepreneurship mindsets and poverty reduction. The most youthful population of the studied countries and government pressures for universities to help reduce unemployment were said to account for this priority. Profound governance and structural changes are taking place in some of the comprehensive universities with strong motivation towards researcher-led entrepreneurship. However, the researcher-led entrepreneurship pattern is generally hampered by a lack of public research funding. Many of our studied universities lack a university-wide discretionary funding base. A good number of the universities’ entrepreneurial projects depend on external funding. In addition to being the main source of research funding, many of the incubators we found are funded by foreign donors.

The countries’ development levels and weak macro financial environments could be huge hindrance to the universities’ entrepreneurial orientation. For instance, some interviewees did not see why they should bring their business ideas to their universities due to low salaries, poor incentives and lack of policies to protect the ideas. This suggests that institutional entrepreneurship mostly thrives in macro financial contexts where academic staff are comfortable with their living standards, whereas a difficult financial climate could as well be a stronger motivating factor to academic entrepreneurship. Finally, a poor profile is a serious hindrance to visibility of the universities. The potentially more entrepreneurial technical and applied sector in Anglophone Africa is often unstructured. Some technical universities we surveyed had very low enrolments and offered identical programmes. The applied and potentially more entrepreneurial establishments, such as IUTs in Francophone Africa, are often dispersed within several universities. This dilutes the institutional potentials of the universities’ identities and profiles as entrepreneurial.

Curiously, one of our case universities, Makerere University (MU), was established as an EPU (Clark 2004). Based on this study, prominent universities, such as MU with all its endowments of age and international

partnerships, could claim itself a leading ‘developmental’ university in sub-Saharan Africa. This is visible from the significant number of competition-based centres of excellence we found and its leadership in several international developmental fields (food security, health, energy, climate change, agriculture, gender, natural disaster, resource management and ICT). The ecosystem is the major drawback for knowledge-based entrepreneurial transformation in Africa. MU has this same ecosystem, which is a major drawback.

Synergistic potentials

Many kinds of transformation are at various stages in the different structural and people-based patterns of entrepreneurship, with potentials to be considered when discussing the emergence of EPU in Africa. One opportunity for full-fledged EPUs pertains to the research-based technical and applied universities in the English-speaking African countries. Another is the reorganization and profiling of the applied establishments, the IUTs and the *Grandes Ecoles* into unique institutional types. This is likely to lead to more entrepreneurially oriented universities in Francophone Africa. Strengthening synergies and complementarities between the comprehensive and technical/applied sector universities, including possible mergers, are likely to render some of the comprehensive universities more entrepreneurial. For example, the Nelson Mandela University in South Africa was created in a 2005 merger between the more entrepreneurial Port Elizabeth Technikon and the comprehensive University of Port Elizabeth. The university became more entrepreneurial, gained larger external funding and engaged with the business environment (van Schalkwyk and De Langué 2018). Gibb (2012) also observes that some universities in the United Kingdom became more entrepreneurial post-merger. Four out of the five of Clark’s (1998, 2004) cases had this technical background.

The dominant student-centred entrepreneurship and the related centres in Africa also present major opportunities for economic development, poverty reduction and graduate employability. These centres and associated courses are important enablers of students’ entrepreneurial achievements (including start-up enterprises) and of national entrepreneurship (De Jager et al. 2017; Tshikovhi and Shambare 2015). Teacher-centred entrepreneurship is a strategic option that can make a university economically active due to direct links with student-centred entrepreneurship. However, this pattern was seen to be marred by insufficient entrepreneurial-teaching cultures and an inadequate number of entrepreneurship lecturers. Student-led entrepreneurship presents another platform for groundbreaking innovations, but it is not strongly embedded as evidenced by poor funding and inadequate facilities for hosting start-ups. A telling example revealed in one of our interviews is that in which a successful student inventor revealed how his mother borrowed money from a bank so that he could develop an idea for a commercially successful product at the university. Inadequate financing also prevents some start-ups from scaling up.

The researcher-led entrepreneurial pattern has potentials for knowledge-based activities. However, insufficient funding is a main hindering factor. It largely relies on internationally funded short-term projects, some of which constrain the development of activities to product-development stages. This can explain many developing countries’ cases where entrepreneurship activities seldom go beyond the exploratory (see Bizri et al. 2019, 384). In addition, this option can be susceptible to frequent and unexpected changes in the policies of the donor countries’ governments. Uganda, in our studied group, showed a gradual shift from this funding dependence pattern for research. Recently, in 2019, the government committed US\$8.1 million as special research and innovation funds for universities. A good number of interviewees commented this commitment as ‘a major step in the right direction’, coming over 30 years since Ugandan HE crises in the 1990s. In more successful cases in our studied group, third-party agencies and ministries sponsored the development of prototypes. This reinforces the need for inter-sectoral collaboration and more integrated innovation systems. Finally, the entrepreneurial islands are a steady opportunity for African universities to become entrepreneurial. This traditional discipline-based approach remains realistic because transforming a whole university to become entrepreneurial is challenging and can stretch its resources; in addition, some disciplines are naturally more applied with greater potentials for entrepreneurship.

Conclusions

In this article, we scrutinized entrepreneurship patterns in selected African universities and analyzed the state of their organizational entrepreneurship, i.e., prospects to be entrepreneurial universities. The notion of synergistic potentials of the patterns with the entrepreneurial university concept influenced us. The study was qualitative, based on case study and theory-driven approaches. We gathered primary and secondary source empirical materials on the structural and cultural patterns of entrepreneurship in eight universities from three African sub-regions (Cameroon in Central Africa, Ghana in West Africa and Uganda in East Africa). We further reviewed the universities’ documents and conducted 49 interviews with African university staff and experts. We used the information collected to undertake a content analysis.

As a result, we identified and established nine patterns of entrepreneurship in the two (English- and French-speaking) African university systems: two structural patterns at system levels, three at university levels and four cultural patterns at basic units, which we labelled. Finally, we designed a framework covering all the nine patterns and analyzed the dynamics of each pattern. No such study has been conducted across Africa, concerning different university sectors to guide the universities’ strategies and strategy documents. The framework is likely to contribute as a mirror and director of attention for planning, analyzing, managing and funding entrepreneurial transformations in African universities. Many of the African university staff in this study cite examples of entrepreneurship activities in their universities and

departments, but almost all miss the broader holistic overview because of the absence of strategy documents with holistic institutional pictures of the patterns we identified. This is not peculiar to our studied African context. Individual academics in naturally loosely coupled university organizations may ignore such managerial categorization and systematic institutional frameworks for planning entrepreneurship, often referring to entrepreneurship activities only in the black boxes of their units. This study has practical implications for institutional managers of universities whose role it is to stimulate entrepreneurship more broadly and strategically, institution wide. It also makes clear theoretical input to the higher education management literature based on differences in the dynamics and context.

The designed framework moves the discussion on African EPU further as a drawing board to spur awareness of such patterns. The systemic structural analysis speaks to policymakers at system levels in Africa, contributing to the development of government-pulled entrepreneurship. Our operationalization of the scholarship on the synergistic potentials in Africa – still marginal in the EPU literature – has implications for other developing countries which lack the institutional characteristics that have supported the emergence of EPUs in the more advanced economies. This synergistic approach provides a level playing field for analyzing and transforming universities across different developmental contexts because it is based on actual practices of universities. Conversely, entrepreneurship can be a common denominational theory for analyzing university entrepreneurial transformation across different contexts. Curiously, these entrepreneurship theories have seldom been used in major EPU scholarship, whereas there are pockets of entrepreneurship in every university. Universities around the globe are transforming entrepreneurially. Rather than borrowing pathways, our holistic framework and analysis of the dynamics and synergistic potential of each pattern is likely to address more effectively the different governance systems, meanings, development contexts and business practices around the African universities.

The African EPU is unlikely to evolve in the same pathways as earlier EPUs because of differences in motivation, strategic options and ecosystems. African universities still face several challenges. Africa, for instance, has one of the most youthful populations. This suggests that graduate employability, student entrepreneurship and job creation will for a long time remain a main motivation and priority for entrepreneurial transformation rather than unique types of innovation-knowledge-based EPUs. The backgrounds and development ecosystems of universities are diverse and heterogenous. One institutional approach to address the diversity of challenges is to develop African EPUs according to typologies. This study suggests that using a third mission analytic framework can be an alternative inclusive approach to determine different dimensions and typologies of EPUs. This entails that the EPU concept and practices (such as income generation dynamics, interactivity with relevant stakeholders-industries-enterprises, self-reliance, autonomy, risk and undertaking cultures, opportunism, flexible

structures, etc.) are bred to the different categories without altering their trajectories, development paths or ignoring the universities' ecosystems.

Another approach is to spur a consortium-network type of EPUs based on different dimensions of third mission where the respective role models of each category mentor universities in same trajectories and develop their entrepreneurship performance indicators to monitor and assess the transformation processes. However, this does not preclude the relevance of national systemic differentiation to produce EPUs and merger of universities with disparate entrepreneurial potentials to achieve strong responsive institutions. The cited case for reorganization and profiling of university establishments into unique institutional types in Francophone Africa will yield interesting results. A performing institutional case in Anglophone Africa suggests that the combination of research with their technical-technological orientations will raise their knowledge economic development functions.

Disclosure statement

No potential conflict of interest was reported by the authors.

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