





Can enabling entrepreneurship ecosystem improve commercialization of research in South African Higher Education Institutions?

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ABSTRACT

An entrepreneurship ecosystem entails a community of practice that displays the characteristics of creativity and innovation, risk-taking, a strategist, and an active participant in identifying opportunities and making decisions among others in the organization. The ecosystem can be key when Higher Education Institutions are engaged in the transformation process of commercialization. The paper intends to explore whether an entrepreneurship ecosystem can stimulate the commercialization of the research process in a sustainable way. The qualitative conceptual review methodology is employed to achieve this aim. The commercialization process is viewed in an entrepreneurship ecosystem by looking at the entrepreneurial institutions, stakeholders involved, and the sustainable business model. It is recommended that adopting an entrepreneurial ecosystem for commercialization of research in Higher Education Institutions can play a crucial role in building their structures to be economically active; addressing graduate unemployment; providing recovery strategies to reboot businesses in communities, especially after the COVID-19 pandemic; and position themselves as entrepreneurial institutions.

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Introduction

Higher Education Institutions (HEIs), especially in South Africa are engaged in a process of transformation by improving curriculums in the programs offered. The structural changes can be shown in several ways ranging from transforming strategies on executive management, academic offerings, services to support staff and impactful deliveries to students through an entrepreneurship ecosystem (Hayter, 2016; Clauss, Moussa, & Kesting, 2018). Creating an entrepreneurship ecosystem is seen as one of the instruments of transformation and can be key when HEIs are engaged in the commercialization of the research process (Sanyal & Hisam, 2018; Cavallo, Ghezzi & Balocco, 2019). An entrepreneurship ecosystem needs a community of practice that displays the character of creativity and innovation, risk-taking, an initiator, a strategist, and an active participant in identifying opportunities and making decisions among others in the organization (Clauss et al., 2018; Ncanywa, 2019).

For a successful transformation through the entrepreneurship ecosystem, HEIs should consider executive roles at different levels. Organizations that build sustainability into their core strategies are outperforming those that don't, especially looking at the environmental factors and climate change (Bradley, Parry & O'Regan, 2020). This assists in creating an entrepreneurial institution (Klofsten, Fayolle, Guerrero, Mian, Urbano & Wright, 2019). The executive role in the entrepreneurship ecosystem entails developing team skills and capabilities and empowering leadership. Leaders need to set simple, measurable, achievable, realistic, and time-bound goals. The set goals should reflect the triad of people, environment, and profit; and focus on creating sustainable impact and implementing sustainable practices. There should be a differentiation between short, mid, and long-term goals that refers to teaching and learning, research, and community engagement as the core business of HEIs (Centobelli, Cerchione & Esposito, 2019). HEIs need to identify the most important goals and prioritize their implementation. The HEIs must be flexible when necessary and

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be able to adjust plans to achieve goals but not change the set goals. HEIs are challenged by several things that range from producing unemployable graduates to accessing digital platforms and producing research that is not entirely innovative and not impactful to society, among several things (Coral & Bernuy, 2022). On the other hand, these institutions need to be transformed to cater to the needs of the people and reach communities with high-quality programs (National Development Plans Vision 2030, 2022). Hence, this paper explores in a literature review methodology whether an entrepreneurship ecosystem can stimulate the commercialization of the research process in a sustainable way. HEIs must find sustainable solutions whereby they strive to attain entrepreneurial skills such as changing societal problems into sustainable opportunities, saving resources, overcoming barriers, and producing research that talks about societal and environmental needs, to name a few.

The paper intends to explore whether an entrepreneurship ecosystem can stimulate the commercialization of the research process in a sustainable way. The qualitative conceptual review methodology is employed to achieve this aim, which asserts the existence of multiple realities, that can be found through interaction and critical analysis of literature (Muscio & Ramaciotti, 2019). Thematic analysis is based on the identification and analysis of critical patterns in the literature that are of interest to a study. In literature, it is seen that adopting an entrepreneurial ecosystem for the commercialization of research in HEIs can play a crucial role in building their structures to be economically active (Clauss et al., 2018; Centobelli et al, 2019; Coral & Bernuy, 2022). An entrepreneurship ecosystem addresses graduate unemployment, provides recovery strategies to reboot businesses in communities, especially after the COVID-19 pandemic; and allows HEIs to position themselves as entrepreneurial institutions (Centobelli et al, 2019). Therefore, the commercialization process is viewed in an entrepreneurship ecosystem by looking at the following themes: entrepreneurial institutions, stakeholders involved, and the sustainable business model.

In this study, a thematic review methodology is employed to explore whether an entrepreneurship ecosystem can stimulate the commercialization of the research process. As a result, the search for relevant themes across various articles was deemed appropriate for the study. Themes are patterns that provide a way of understanding a study. They are essential in providing general data patterns, which can offer to mean to required concepts related to the study. The thematic analysis, therefore, was essential in this study as it provided important information that was essential for providing meaning. Such information can also be significant as they were drawn from various literature sources.

Theoretical and Conceptual Background

The paper aims to review whether an entrepreneurship ecosystem can stimulate the commercialization of the research process in a sustainable way. The social network theory, knowledge spillover theory of entrepreneurship, and stakeholder theory are adopted collectively to explore this process. The social network theory entails that for a successful entrepreneurial ecosystem HEIs should connect with businesses (Clauss et al., 2018; Fuster, Padilla-Meléndez, Lockett & del-Águila-Obra, 2019). This could benefit the institutions in that the knowledge production can be disseminated to relevant businesses and contribute to informed social change. In addition to the connectivity of the social network theory, the knowledge spillover theory of entrepreneurship confirms that there can be spillover effects from institutions to firms (Fuster et al., 2019). This theory entails that the context of where the institution exists should be taken into consideration.

The context includes the location of the institution, strategic entrepreneurship, and how institutions relate to others. Institutions that adopt an entrepreneurship ecosystem have a purpose to stimulate economic activities by sharing their knowledge production with firms that need so. Therefore, the social network theory and the knowledge spillover theory of entrepreneurship applied together can contribute to innovation development and create an entrepreneurship ecosystem that connects institutions to firms. These ecosystems bring a social culture that creates benefits (Spigel & Harrison, 2018). Clauss et al. (2018) suggest the schematic diagram shown in Figure 1 of the stakeholders in the entrepreneurship ecosystem for the entrepreneurial university.

The paper has alluded that the entrepreneurial university ecosystem comprises of stakeholders such as researchers, students, firms, society, and administrators. These stakeholders of the ecosystem are coordinated in a way that there are interactions among them to build an entrepreneurial culture. For successful coordination, it is not always a direct interaction between the administrators to the firms, but connections can take place wherever there are commercial activities in the ecosystem. This can improve the university's commercialization process, especially if it considers the diversity of the ecosystem (Eagle, Macym & Claxton, 2010).

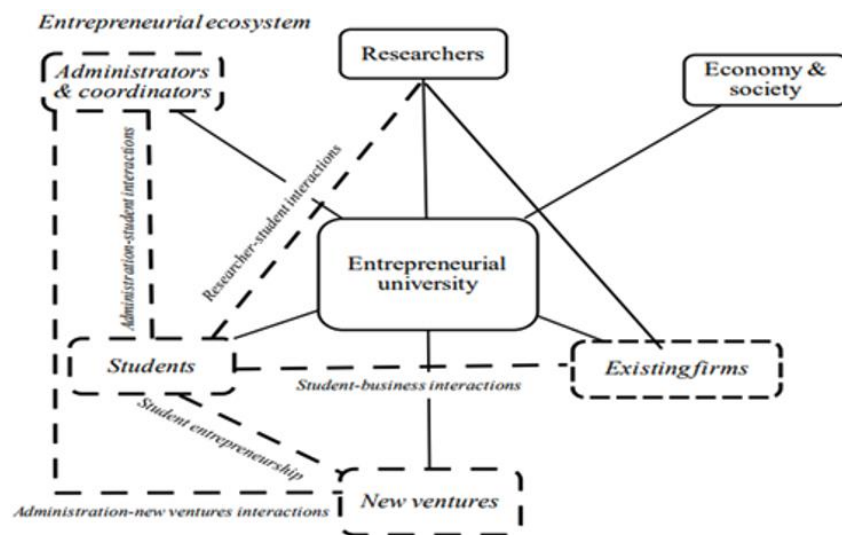


Figure 1: An entrepreneurial university ecosystem; *Source:* Clauss, Moussa, & Kesting, 2018

Entrepreneurial institutions

Lessons are learnt from other countries on how to build an entrepreneurship ecosystem in HEIs. For instance, in Malaysia Ahmad, Halim, Ramayah, Popa, and Papa (2018) shared that there are guidelines and policies that should be formulated to build a strong entrepreneurial university, otherwise existing activities are not formally coordinated. In addition, in a Finnish university, research and education have been found to promote academic tasks for technology innovation and transfer of knowledge (Lahikainen, Kolhinen, Ruskovaara, & Pihkala, 2019). Therefore, an entrepreneurial institution provides solutions to the environment that has unpredictable effects in its own context.

An entrepreneurial institution transforms from traditional ways and has key structural reform. The organizational structure creates posts that focus on entrepreneurship, teaching methods that are entrepreneurial, has a clear incentive system, forms strong partnerships with external stakeholders, and has incubators with technology transfer officers (Lahikainen et al., 2019). This can contribute to the enhancement of an entrepreneurial mindset to make things easy on academics on approaches adopted to introduce the entrepreneurship ecosystem. There should be policies on patents, intellectual property rights and licensing of products or services produced by academics. In a nutshell, academics should be able to change ideas from problems to business opportunities for personal and institutional gains (Klofsten et al., 2019). This adds value to the ecosystem not only to be a profit-making organization but create a valuable system for society while enjoying some economic gains.

In an entrepreneurial institution, academics should vision themselves as academics that have a role of an entrepreneur. Being an entrepreneur should not be seen as a separate responsibility from the core function of the institution (Ahmad et al., 2019). Instead, it should be seen as an expansion of core responsibilities where for instance outcomes of research can be commercialized. The institutions should provide entrepreneurship centres or clinics for venture creation where there is a balance between teaching, research, and entrepreneurship (de Araujo Ruiz, Martens & da Costa, 2020).

Based on the entrepreneurial university ecosystem displayed in Figure 1, the pillar of research informs that an entrepreneurial university develops entrepreneurship education courses (Clauss et al., 2018). These form bases of the commercialization process where areas of innovation and research develop new products or services. Researchers are encouraged to be engaged in research that addresses the sustainable development goals and the challenges of the country such as issues of quality education, poverty, unemployment, and others (Sanyal & Hisam, 2018). Research produced should inform policy and there should be an authentic review of the produced research and elements that talk to society. Research also informs administration where metrics are used to evaluate outcomes of the research in a virtual cycle (Clauss et al., 2018).

The university administration pillar in Figure 1 further acknowledges that it allocates resources that can be used to build an entrepreneurial culture. In addition, the university administration constructs structures and provides an incentive system in terms of intellectual property rights, licenses and patents. There should be a public policy on economic activities and how the entrepreneurial university contributes to the economic development policies of the country. This coordination between public policy and universities can assist the government to provide relevant resources for developing the state.

Stakeholders in an entrepreneurship ecosystem

Academics

Academics provide entrepreneurship courses to students and communities as a community engagement activity. For instance, Muscio and Ramaciotti (2019) attest that the provision of entrepreneurship education can influence students' intentions to start a business.

This provides an alternative plan for students in case they become unemployed when they complete their studies. Academics providing entrepreneurial skills to students encourages them to be able to shape their entrepreneurial decisions (Rahim et al., 2015). There should be training to empower academics to be able to provide entrepreneurship education.

Entrepreneurship education should be provided by academics who are trained in the mode of delivery of entrepreneurship (Mandel & Noyes, 2016; Gubbins, Harrington & Hines, 2020). For instance, entrepreneurship can be taught in a practical way, where students “learn by doing”. The practical approach exposes students to develop problem-solving and creativity skills. The most common assessment method is when students at end of the course can write a business plan essential for funding and marketing the business (Gubbins et al., 2020).

A good entrepreneurship course should show students how to formulate a business plan that provides best practices to empower students on the best marketing strategies (McKenzie, 2017). Examples of marketing strategies are when business owners capitalize on a product/service that is unique, high quality, low-priced, satisfies other needs of your target audience or a combination of these. The marketed product needs to be tested before the business starts and compared with the competitors to identify a competitive advantage (Gubbins et al., 2020). This would assist in showing that delivery will be on time and how you would overcome problems. In the business plan, there should be a description of advertisement plans, promotion activities and how to reach target groups. These include digital and new technologies, brochures, flyers, and particularly word-of-mouth. There should be a written plan on how to create and maintain relationships to retain customers, and this can be documented in a people’s book. Customer satisfaction through positive word of mouth can reduce the cost-of-service delivery. Trained entrepreneurs apologize when in the wrong, build trust, are polite, courteous and respectful (McKenzie, 2017; Gubbins et al., 2020).

Students

Students in HEI are primary stakeholders and the backbone of the business as they are paying clients. The majority of HEI students are youth under the age of 35 years old who are the future of the country. The current economic state of South Africa with the unemployment rate at a staggering 35.3%, with 66.5% of the 35.3% being the youth makes it difficult to find employment (Statistics South Africa, 2022). The unemployment rate sadly includes graduates from the HEIs who most solely depend on formal employment as prospects for income after completing their studies. The country generally depends on the government for job creation even though it is recognized that the small medium and micro enterprises (SMMEs) create more than a quarter of jobs in South Africa, contribute 90% to the global economy, and make up 90% of African businesses (Akugri et al, 2015; Saah, 2021). However, SMMEs are vulnerable and more than 70% fail in the first 5-7 years due to a lack of sustainable business models, among many reasons (Bushe, 2019). Sustainable business models are informed by entrepreneurial knowledge and enable the entrepreneurship ecosystem.

Traditional university programs do not incorporate entrepreneurship in the teaching and learning activities. As a result, HEI students complete their studies and graduate with minimal to no knowledge of entrepreneurship, including postgraduate students that undertook research worth commercialization. The challenge is acknowledged and being addressed during the transition to entrepreneurial university whereby the institutions participate in the Entrepreneurship Development in Higher Education (EDHE) initiative that is led by Universities South Africa organization (EDHE, 2022). The EDHE program trains university stakeholders on entrepreneurship and their 2022 theme is “Commercialization of Research”, which speaks to the entrepreneurial university transition. Additionally, there is Enactus South Africa which is a non-profit organization that trains university students to be entrepreneurial leaders who use innovations and business to improve the world (Enactus, 2022). The Enactus South Africa program has 27 HEIs participating in various outreach projects and business concepts that solve societal challenges (Enactus, 2022). Creating an entrepreneurial ecosystem for HEI students not only trains them to be creative, innovative and strategist in identifying profitable solutions to societal problems, but address unemployment, and poverty and relieve the sense of dependence on government.

Entrepreneurship ecosystem at HEIs enables student-run businesses that instill the concept of circular economy as they will graduate knowing that they can trade services and products amongst themselves and surrounding communities. For instance, a salon will provide beauty services, specialized cleaning services for weaves/sneakers, cafeteria provide refreshments while farmers supply for the cafeteria. The entrepreneurship ecosystem enlightens students to value overlooked skills such as hairdressing, farming and cleaning. If a graduate chooses the corporate career route, they can still run the business as an extra source of income and employ others for day-to-day operations.

The years of experience accumulated in entrepreneurship while in university could deepen students’ understanding of the service or product they are rendering (reference). In so doing, they could be able to formulate research concepts on improving the product or service with consideration of Sustainable Development Goals, National Development Plans, serving communities, sustainability of the SMMEs, and environmental impact. The HEIs in rural areas have a lot of under-explored business opportunities given the challenges and lack of services that speak to the needs of the communities. Students trained in entrepreneurship might be compelled to rather apply their knowledge to start businesses in their communities instead of feeling obligated to migrate to big cities seeking employment. Consequently, the economic activities in the rural areas can improve and subsequently improve the quality of life due to a sustainable entrepreneurship ecosystem. Hopefully, service delivery will be ramped up to meet the infrastructural needs of SMMEs and further encourage student entrepreneurship so that it extends to high school learners.

Firms and society

The process of commercialization needs researchers to collaborate with other parties outside the institution and form partnerships with stakeholders such as firms and society to strengthen the process. For instance, commercialization can have a significant impact on translating research and development (Downie, 2005). The partnerships integrate activities among businesses, HEIs, and publicly-funded research organizations. There can be a research consortium and research platforms that focus on the commercialization of research. For example, the EDHE program seeks to change the research landscape by creating platforms to support entrepreneurship activities in universities where there is a community of practice that focuses on research (EDHE, 2022). The project contributes to building strong collaborations among academics and linking universities to the private sector and potential investors. In 2022, there was a workshop that empowered academics on skills of commercialization (EDHE, 2022).

Linking HEIs with firms and other social partners in the commercialization process can have a sustainability impact on both the institutions and the communities that are served by them. For instance, firms attached to HEIs can invest huge amounts of money if the research output produced has a direct impact on the industry production. This also creates new opportunities for graduates produced by institutions and therefore can result in skilled graduate employment and job creation (Downie, 2005). Moreover, researchers remain relevant to address societal needs and make an impact with the investment they receive. HEIs use innovation to sustain their research and continue to grow.

Several examples of activities that can emanate from the relations range from including industry peers on review processes of universities and researchers being involved in industry space in activities such as board members, consultants, and speakers (Umoren, James & Litzelman, 2012). The partnerships can result in new degrees being born such as postgraduate diplomas and degrees in innovation and entrepreneurship. Some firms and other partnerships need to engage in formal agreements like the signing of memorandums of understanding or agreement (Skelcher, 2010).

Cohen, Nelson and Walsh (2002) in their study in the United States of America found that HEIs partnering with society contributed to the efficient production of the manufacturing sector. Public research had a significant impact on both large firms and start-ups. It was suggested in their paper that partnerships were established through research publications, published reports, meetings, consultations, and the exchange of informal information (Cohen et al., 2002). In addition, Hsu (2006) found that partnerships and collaborations can enhance growth and sustainability in start-ups.

Administrators

In the commercialization of research through an entrepreneurship ecosystem, administrators range from institutional management, technology transfer officers, commercialization managers, or officers and lawyers. The institution leadership in management should have the technical expertise to lead the commercialization process and be flexible to adjust where necessary. In the implementation phase, leaders need to recognize that there will be a cultural change in the institution (Aubakirova, 2020). This affects structures, and leadership needs to find ways to report changes to the institutions' formal reporting structures and concertize the entire community that there will be changes in processes, systems, roles, and relationships. Transformational changes should improve the quality of offerings in the institution (Simsek, 2013).

There should be new structures formed for the commercialization process to succeed (Downie, 2005). Commercialization needs structures such as centers of entrepreneurship and innovation, technological transfer offices, institutes of entrepreneurship, and incubators among others. These structures should promote the participation of entrepreneurship activities and have platforms to link institutions with the private sector to increase partnership agreements. In addition to technology transfer officers, there should be commercialization managers or officers and, lawyers specializing in contracts. In top management, there should be a Deputy Vice-chancellor or Senior director responsible for innovation. There could be new firms within the universities that are entities assigned to generate revenues for universities. For instance, in New Zealand, Auckland University's Uniservice Ltd deals with commercialization aspects and generates huge revenues for the university (Downie, 2005). Also, other universities in South Africa own hospitals used to train students, conduct research, and generate revenues for the university. Universities can also offer new degrees and diplomas in programs such as entrepreneurship, innovation management, and any others as they see fit in their surrounding environments. The programs in commercialization need to be provided with proper infrastructure and be offered by qualified human resources (Aubakirova, 2020).

A business model

In the process of commercialization of research, many scholars attested those institutions should train researchers on how to design a sustainable business plan (Umoren et al., 2012; Joyce & Paquin, 2016; McKenzie, 2017; Aubakirova, 2020; Gubbins et al., 2020). The business plan aims to equip participants with entrepreneurship skills that are essential in curbing graduate unemployment, promoting commercialization of research, and reducing the failure of Cooperatives/SMMEs. Participants should be trained in a short course to populate a business plan that can be summarized in a business model canvas found in Figure 2 (McKenzie, 2017; STEP, 2022). Figure 2 details a template where after the training participants complete the table and should be empowered with entrepreneurship skills to start their ventures.

Figure 2 is a summary of modules that capacitate participants to have a sustainable business plan that can be used to start a business and to source funding. The course content entails the following modules (STEP, 2022): Ideation where ideas are derived from problems to sustainable business opportunities; Opportunity Development which deals with the owner’s strengths, social resources, creativity, vision statement; Planning and Implementation to craft goals, development plans, and personal initiatives; Marketing strategies; Finance management and budgeting; Budgeting (Cash and Capital Budget, Income and Expenditure Budget); Book-Keeping; How to overcome barriers and manage risk in a business; Sustainable Business Plan and registration of the business.

Problem		Opportunity/Solution		
Vision & Mission				
Sustainable Partnership	Sustainable Value Creation	Value Proposition		Customer Segments & Beneficiaries
	Sustainable Resources	Social Value	Environmental Value	
Cost Structures & Additional Costs			Revenue & Sustainable Benefits	
Negative Impact			Positive impact	

Figure 2: A business model template; *Source:* www.step.co.za

Figure 2 shows a business canvas template derived from the sections of the short course explained above and therefore, linking a business canvas to a business plan creates the business model. The business canvas is a picture representing questions that assist in clarifying the idea and value creation process (Joyce & Paquin, 2016; Sparviero, 2019). The sustainable business model converts ideas into realities by pushing an entrepreneur to carefully think about the specifics of the business to achieve the set goals. The first row in Figure 2 entails how the identified problem can be used to identify solutions as opportunities to start a business. The model describes how a company creates, delivers, and captures value for all its actors and natural resources. It sells the idea to stakeholders, minimizes the possibility of failure and maximizes the likelihood of success.

To explore a sustainability-oriented business model, the business canvas explains how an organization can generate value by considering economic, environmental, and social issues together in an entrepreneurship ecosystem. Formulating a business model canvas supports in the development and communication of the business plan in a holistic and integrated manner (Joyce & Paquin, 2016). Integrating the economic, environmental and society aspects in the formulation of a business plan supports creativity and innovation in building a more sustainable business model. For instance, in Figure 2 the sustainable value creation link with the operational plans, value proposition, relationships, customer segments and beneficiaries link with the marketing plan, cost structures, revenues and sustainable benefits link with a financial plan.

The sustainable business model explains how relations among stakeholders engage through marketing plans that include unique and diversified products (Fritscher & Pigneur, 2014). There should be revenue streams and key activities designed to generate income to sustain the functions and operations of the business. Every start-up implies taking risks and thinking about potential critical risks in the financial plan helps to deal with the risks when they happen. The complete business model plans on registration and the type of business to be involved in.

Conclusions

The study aimed at exploring whether an entrepreneurship ecosystem can stimulate the commercialization of research in a sustainable way at Higher Education Institutions (HEIs) using a qualitative concept review methodology. The commercialization process was dissected into entrepreneurial institutions, stakeholders involved, and sustainable business models as key elements of an entrepreneurship ecosystem. The study revealed that HEIs need to review teaching and learning to incorporate entrepreneurship, engage all relevant stakeholders, equip academics on the entrepreneurship concept, have enabling policies and specialized services such as technology transfer officers, patent licensing lawyers and incubators. HEIs stakeholders relevant for entrepreneurship are academics, administrators, students, firms, and society.

The role of academics in creating an entrepreneurship ecosystem in HEIs is to include entrepreneurship as community engagement in their duties and teach entrepreneurship using a “learn by doing” practical approach. The outcome of the course is a complete sustainable business model that speaks into profit generation, environmental and social impact. Students trained in entrepreneurship could become innovative, strategic thinkers and creative in devising profitable solutions to societal problems. The taught sustainable

business model and enabling entrepreneurship ecosystem will ensure thriving students' businesses that address graduate unemployment, improve quality of life, instill circular economy concepts and produce international competitive multi-skilled graduates. The entrepreneurship ecosystem can be strengthened by sharing knowledge and forming partnerships with firms and society. Entrepreneurial universities will have intentional stakeholders who formulate research worth commercializing to constantly upgrade services and products while creating a third stream of income for the HEIs.

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