A Framework for Defining, Describing, and Diagnosing Entrepreneurship Ecosystems within Sub-Saharan African Higher Educational Institutions.

The Sub-Saharan African Higher Educational Institution Entrepreneurship Ecosystem Development Project of The Education Collaborative.

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Executive Summary

Global unemployment has reached 6.5%, or around 220 million people (UN Stats, 2021). Despite Sub-Saharan Africa's unemployment rate of 6%, some countries within the region have the highest unemployment rates globally. Countries throughout Africa, particularly in Sub-Saharan Africa (SSA), must consider restructuring their economy to combat the high unemployment rates among young people and women, who are the most affected. Entrepreneurship and innovation have been commonly acknowledged as crucial long-term growth and competitive advantage drivers required to overcome the problem of rising unemployment. To drive economic growth and reduce the rising unemployment rate, many nations have implemented strategies that promote entrepreneurship and innovation, such as sustainable entrepreneurial ecosystems (SEEs). One of the sectors tasked with developing and advancing SEEs is the higher education (HE) sector.

Higher Education Institutions (HEIs) must train the global workforce and address human resource needs. However, they cannot do it alone. HEIs must engage government, industry, civil societies, and policymakers to create sustainable entrepreneurship ecosystems. This will equip them to carry out this mandate by providing an enabling environment that supports the entrepreneurial ambitions of students, staff, communities, and other stakeholders. Never has the need for creating SEEs within HEIs been more relevant.

Against this backdrop, the Entrepreneurship Ecosystem Development (EED) project was commissioned by The Education Collaborative at Ashesi University as one of its thought leadership projects to foster the development of active Entrepreneurship Ecosystems (EEs) across HEIs within the SSA region. The project has three key phases, with the overall aim of developing an e-playbook that will aid HEIs in exploring, understanding, and measuring their EE envi- ronment in a way that allows them to develop interventions that move them closer to their EE aspirations.

This report documents the first phase of this project, which proposed an exploration of the internal EE of HEIs in SSA to arrive at a definition of and a framework to aid HEIs in SSA in describing their EE. It explores a sound methodology for the entire project while prescribing an appropriate one for studying the internal EE of an HEI. A sequential Mixed Methods Research (MMR) design that employed qualitative and explanatory approaches was adopted for this study to address the following four objectives:

◆ To define EEs within the context of HEI in SSA;

◆ To design a logic model and appropriate methodology for the study of EEs within HEIs in SSA;

◆ To identify and develop an appropriate theory and conceptual framework for the study of EEs within HEIs in SSA; and

◆ To develop a theory of change and transition process to enable HEIs in SSA to achieve active EEs.

In addressing these objectives, data was collected in three phases: (1) through desk study research; (2) engaging experts (i.e., HEI EE actors) and other actors within the more extensive EE on country and continent-level landscapes as well as academics; and (3) primary cross-sectional data collection. The primary cross-sectional data collection techniques included Key Informant Interviews (KIIs), Focused Group Discussions (FGDs), and surveys. These were targeted at the university leadership, staff, students, primary stakeholders, and collaborators of the HEIs. This document reports on the desk study as was conducted to arrive at four significant findings: (1) a formal definition of EE within the HEIs of the SSAs; (2) a validated conceptual framework for EEs within the HEIs of the SSAs; (3) appropriate methodology for the study of EEs; and (4) a theory of change and a transition mechanism for HEIs where their internal EE is concerned.

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Abbreviations

AU	Africa Union
CA	Cronbach Alpha
CEO	Chief Executive Officer
CFA	Confirmatory Factor Analysis
COP	Community of Practice
CSO	Chief Security Office
DID	Difference in Differences
EARE	Extracurricular Activity Relating to Entrepreneurship
EFA	Entrepreneurship Ecosystem
EE	Exploratory Factor Analysis
ES	Focus Group Discussions
FGD	Global Entrepreneurship Monitor
GEM	Entrepreneurship System
GLM	Guiding Logic Model
HEI	Higher Educational Institution
HACSi	HEIs' Ability to Connect Start-Ups with Industry
HR	Human Resource
ICT	Information and Communication Technology
ILO	Industry Liaison Office
IRB	Institution Research Board
KIIs	Lifelong Learning
LLl	Logic Model
LM	Key Informant Interviews
MEES	Innovation Research and Development
MCPE	Multidimensional Entrepreneurial Economy Scale
MENA	Mixed Method Research
MMR	Middle East-North-Africa
NGO	Mentoring and Coaching Programmes for Entrepreneurs
SDGs	Non-Profit Organisations
SMEs	Sustainable Development Goals
SSA	Sub-Saharan Africa
I, R & D	Small and Medium Size Enterprises
SEE	Sustainable Entrepreneurship Ecosystems
SOE	Student Orientation on Entrepreneurship
SEM	Structural Equation Modelling
ToC	Theory of Change
UN	United Nations
WEF	University-Based Entrepreneurial Ecosystems
U-BEE	World Economic Forum
WHO	World Health Organisation

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1.0

General Introduction

1.1 Background

Entrepreneurship and innovation are critical drivers of sustainable development and competitive advantage. Many countries and regions have begun adopting strategies that encourage the formation of sustainable entrepreneurial ecosystems (SEEs), which aim to boost economic development (Theodoraki et al., 2017). This has become relevant given the high unemployment rate among the general populace and university graduates. The global unemployment rate is 6.5 percentage points, representing approximately 220 million people (UN Stats, 2021). Sub-Saharan Africa has a rate of 6.0 percent, but some of the countries in the region experience the worst rates. Countries across SSA are thus beginning to rethink how to reengineer their economies to overcome the high unemployment rates among the youth and women who are the most affected. One of the re-engineering tools proposed to address this challenge of high unemployment by these countries has been HEIs and their associated entrepreneurship ecosystems (EEs). Over the last two decades, there has been a growing interest in ecosystems among scholars, policymakers, and practitioners as an approach to understanding the context of entrepreneurship at the macro level of an organizational community (Stam & Ven, 2019). Several scholars have used a system framework for studying entrepreneurship ecosystems in attempts to understand entrepreneurial economies from a systemic perspective (Stam & Ven, 2019). The systemic approach has been divided into:

(1) a business development approach that focuses exclusively on the agency - the individual entrepreneur; and

(2) a community development approach that focuses on context - place. Scholars who focus on the agency approach (e.g., Lichtenstein & Lyons, 2001) have argued that the creation of an "entrepreneurial service system, or support ecosystem, which is systemic, focused on the needs of the entrepreneur, not the business, and committed to transforming the entrepreneur and community" (Markley et al., 2015), while the scholars, practitioners, and policymakers who focus on the community entrepreneurship/ development approach have tried to identify and implement the community-based strategies to support entrepreneurs. According to Markley et al., (2015), both approaches are needed to develop entrepreneurship ecosystems that achieve economic transformation effectively. The authors further argue that the pursuit of entrepreneur-focused economic development systematically, at the community or regional level, "share(s) a common assertion that successful enterprise development must take into account the entire community and build the necessary capacity to foster entrepreneurship across the community".

(3) Thus, according to Markley et al. (2015), both the business development and community development approaches are suitable for studying EEs within the HEIs, as they provide a more holistic basis for assessing their EEs from a contextual and an internal development perspective.

1.2 Problem Statement

HEIs worldwide are mandated to train the nation's workforce and adress its human resource needs. However, the current economic environment has challenged most institutions to drop traditional mindsets and become more forward-thinking in delivering transformative education to their students instead of simply ensuring they acquire degrees. Universities of the 21st century must be entrepreneurial, innovative, and developmental. Conversations have shifted from universities being entrepreneurial to universities being explicitly committed to social inclusion through knowledge and, more broadly, to the democratization of knowledge along three main avenues: reformation of access to higher education, decentralization of research agendas, and decentralization of knowledge diffusion (Etzkowitz, 2013).

HEIs must engage stakeholders such as government, industry, civil societies, and policymakers to create sustainable EEs with a mandate to provide an enabling environment that supports their entrepreneurial ambitions and those of their students, staff, communities, and other stakeholders. Additionally, HEIs are frequently cited as critical institutional actors in national innovation systems, influencing innovation creation, development, and dissemination (Kuhlmann & Arnold, 2001). The literature on national innovation systems emphasizes the importance of strong links between these various institutions in improving national innovative and competitive performance, competitive performance, particularly

on HEIs within national innovation systems (Mowery & Sampat, 2009).

Never has the need for creating SEE within HEIs been more relevant. EEs are an interconnected group of actors in a local geographic community committed to supporting the development of new ventures (Cohen, 2006). Ecosystems are essential in enhancing the ability of HEIs to transition from a traditional focus (teaching and research) to a transformative focus (innovative and entrepreneurial) within the third mission of 'societal engagement' that must be centered on the vision and mission of the universities.

Indeed, research in the field has demonstrated that for players within the HEIs to address the economic and social challenges faced by nations and communities, they must develop entrepreneurial, innovative skills

1.3 ▸ Desk Study Research Objectives

The overall aim of this project is to explore the internal EE of HEIs in SSA to develop a playbook that will aid them investigate, understand, and measure their EE activities and aspirations, which will enable them to develop interventions to help them achieve their aspirations. The following four specific objectives were established to guide the desk review as well as the development of a conceptual framework for this study:

1. Define EEs within the context of HEI in SSA.
2. Design a logic model and appropriate methodology for studying of EEs within HEIs in SSA.
3. Identify and develop an appropriate theory and conceptual framework for the study of EEs within HEIs in SSA.
4. Develop a theory of change and transition process to enable HEIs in SSA to achieve active EEs.

HEIs must develop entrepreneurial, innovative, and other 21st-century skills among their students, staff, and communities. In other words, HEIs must support the development of sustainable ventures that address the needs of their countries and surrounding regions.

This desk study sought to explore the EE literature and focused on HEIs, specifically universities. It intended to explore the definitions used within the EEs and identify an appropriate one. Further, it sought to develop a conceptual framework for the HEIs' EE in sub-Saharan

Africa (SSA).

1.4 ▸ Desk Study Research Questions

The corresponding research questions relative to the stated objectives are as follows:

1. What definition of EEs will be ideal for analyzing EEs within HEIs in SSA?
2. What will be the most appropriate logic model and method for studying EEs within HEIs across SSA?
3. What theoretical and conceptual frameworks inform the study of EE in HEIs across SSA?
4. What theory of change and transition process will enable HEIs in SSA to achieve active EEs?

1.5 ▸ Overview of Desk Study Methodology

The detailed EED project methodology report can be consulted to understand the philosophical underpinnings of the methodology options, the choices made, and a justification for which methods were adopted. This report does not capture the outcomes of the entire study but does so for its first phase.

1.6 Significance of the Study

The importance of this study is to contribute to the existing EE literature specifically by providing the HEI and SSA contextual nuance. As a result, the HEIs will be provided with the tools needed to evaluate their EEs to achieve active EEs. Once an active EE is attained, it will help HEIs achieve Goal 2 of the AU Agenda 2063 and SDG 4, which are both on quality education, specifically within the context of HEI and SAA. The findings of this study will inform stakeholders of HEIs about how their internal EEs are structured to help them plug into the full potential they provide for mutual benefit, as well as help HEIs to be intentional about supporting the EEs of the communities they find themselves in towards enhancing socio-economic development. Ultimately, this study will aid HEIs in achieving their entrepreneurial aspirations while becoming entrepreneurs.

" The findings of this study will inform stakeholders of HEIs about how their internal EEs are structured to help them plug into the full potential they provide for mutual benefit

1.7 Organization of the Report

The report is divided into the following seven major sections:

The first is a general introduction that includes the study's context, problem statement, research objectives/questions, a concise description of the research methodology, and the significance of the study.

The second section discusses the research methodology for desk studies. This section discusses the three phases of the project's guiding philosophy, research design, methods, and survey strategy.

In the third section, the following topics will be discussed: EE definition, higher education institutions (HEIs), supplemental security income (SSA), creation of conceptual framework, conceptual framework proposal, and validation.

The fourth section examines the theory of change, the guiding logic model, and the process by which HEIs can become active. EEs.

The fifth section provides a summary and findings of the desk research.

The sixth section describes the conceptual framework's validation.

The seventh section concludes the report with an evaluation of the most suitable methodology for EE research.

2.0

Desk Study Methodology

2.1 ▸ Introduction

This section of the report explains the methodology adopted for the desk study to arrive at operational definitions of concepts to guide the EED project. It also describes the authors' process for selecting documentation to be reviewed. The focus of this report is to provide an overview of the literature review that enabled the team to define the EEs of HEIs and thus address the first research question. This section of the report is organized as follows: subsection two discusses the methodology used to achieve the objective of this report. It concludes with a summary of insights.

2.2 ▸ Methodology

This report's objective was primarily attained through a desk review of the pertinent literature. The systematic literature review followed a formal, consistent methodology for selecting and analyzing scientific data (Snyder, 2019).

2.2.1 ▸ The Desk Study Conducted

In this context, the study adhered to several best practices recommended by prior research, including methodological (Tranfield et al., 2003), synthesis (Mujahid et al., 2019), and entrepreneurship ecosystem literature that have proposed and utilized systematic literature reviews (AlvedaLen & Boschma, 2017; Audretsch, 2002; Cavallo et al., 2018; Hayter et al., 2018; Hechavarria & Ingram, 2014; Matt & Schaeffer, 2018).

The following criteria proposed by Nabi et al. (2017) served as the foundation for the final selection of articles reviewed using the team's literature review matrix. Among the criteria were:

1. Peer-reviewed published articles and book chapters rather than working/conference papers or unpublished work.

2. Papers primarily focused on entrepreneurship ecosystems, innovation ecosystems, entrepreneurial education (or elements thereof), and its empirical impact on entrepreneurship outcomes (broadly defined to include attitudinal and behavioral outcomes) within HEIs.

3. EE respondents from HEIs (rather than primary/secondary schools and non-higher education levels) were sampled. Since the HEIs within SSA are the unit of analysis in this study, other actors within the national systems of innovations (e.g., large companies, mature SMEs, government actors involved in research innovation and policy formation, etc.) could not be sampled.

The preliminary desk research was carried out between October 2021 and January 2022. This entailed conducting a Google Scholar search for relevant articles using the key term 'Entrepreneurship Ecosystem' from 1990 to 2021.

The search yielded over 90,800 review articles when citation was used as a search criterion. For inclusion in the review, the first 50 pages of papers were reviewed to identify relevant papers that were cited at least 10 times. This was accomplished by reviewing the title and abstract to determine whether the paper focused on entrepreneurship ecosystems. During the review, the team discovered a research theme centered on 'university-based entrepreneurial ecosystems' (U-BEE). A second Google Scholar search used the term 'University-Based Entrepreneurial Ecosystems' to identify studies that used the term in their title or abstract. This search yielded a total of 9,458 articles. After applying the same criteria, 104 articles were considered for screening. Approximately 17 articles were identified and included in the database of selected articles for review after a review of the topic and abstract.

Another point of interest was finding articles about the African continent relevant to the study. As a result, the study was carried out by scrutinizing bibliographies and relevant references from critical EE reviews and reports conducted during the period and already included in the database. This prompted another Google Scholar search for "entrepreneurship ecosystems in Africa" from 1990 to 2021, yielding approximately 24,600 articles. The team read the first fifty pages to find articles that contained the words 'Entrepreneurship ecosystem' and 'Africa' or an African country in the title or abstract. After reviewing the articles, the researchers identified and added ten relevant ones. The research team created and used a literature matrix to capture various themes such as authors' names, titles, definitions used, aims/purpose of the study, research questions, study context, data methods used, and key findings (Wallace & Wray, 2011). Two researchers worked together to review the articles and extract data based on the themes identified following the initial data entry on the literature matrix. As an internal verification process, a third research team member performed a verification exercise to ensure that the data was entered correctly. The review yielded 372 relevant articles, which were further examined by reading the introduction and conclusion. The review included 247 articles and two book chapters after applying the identified inclusion criteria.

Furthermore, between January and February 2022, a search for articles was conducted to identify specific articles that focused on EE measures. The team was especially interested in studies that identified and developed EE enablers or indicators, as well as those that researched and operationalized EE enablers/indicators. A total of 144 articles were identified for eligibility, with 93 addressing the EE indicators, some identifying the enablers/indicators, operationalizing them, and/or testing the developed models to establish the EE. The articles were reviewed, and an indicator matrix was created to capture the enablers/indicators.

In addition, a new literature search was conducted in May 2022 to identify articles to supplement the first two phases and further enhance the study. This search yielded a total of 17,900 articles from 1990 to 2022. After reviewing of the records and the established procedure, 175 articles were considered for eligibility using the identified criteria. The final review included only 150 articles. A total of 490 articles and two book chapters were reviewed for the desk study.
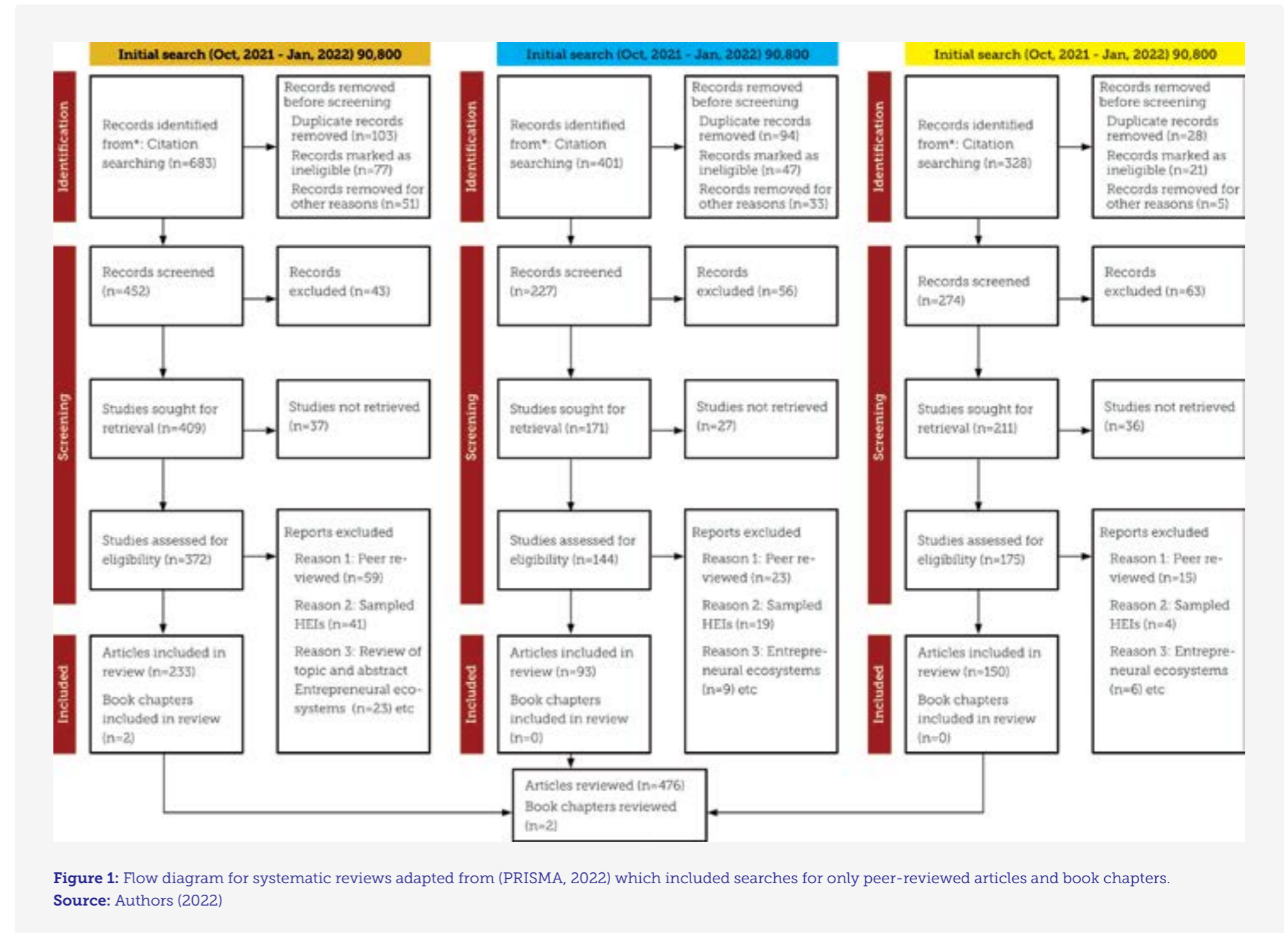
Figure 1: Flow diagram for systematic reviews adapted from (PRISMA, 2022) which included searches for only peer-reviewed articles and book chapters.
Source: Authors (2022)

A Summary Of Insights From The Review

The desk review afforded the opportunity to glean some insights for directing the entrepreneurial ecosystem project. A critical analysis of the identified literature has revealed gaps in the EE literature that must be filled. Several insights from the literature review relative to the definition of EE within the context of HEIs and SSA are provided below.

1

The review of Entrepreneurship Ecosystems (EE) literature shows that, despite its popularity, EEs remain loosely defined and measured. The existence of different definitions alludes to the fact that there is no consensus on a definition that best explains an 'entrepreneurship ecosystem' or links the EEs concept to the HEI context.

2

Higher Education Institutions (HEI) are essential actors and contributors to developing. entrepreneurial ecosystems through research, innovations, and education of a skilled labor force. This has enabled researchers worldwide to begin to see HEIs and their surroundings as a distinct ecosystem that helps entrepreneurs develop their business ideas. Therefore, universities are a force to reckon with as they promote entrepreneurial culture, act as a catalyst for start-ups and spin-offs, and provide knowledge and human capital (students and faculty).

3.0

Operational Definitions

3.1 ▸ Introduction

This section of the report is meant to clarify what constitutes entrepreneurship ecosystems in higher education institutions within the context of Sub-Saharan Africa and propose a conceptual framework that best describes EEs within HEIs in SSA. Therefore, this section addresses research objectives one and two, which are stated as follows:

The focus of this report is to provide an overview of the literature review, which enabled the team to define the EEs of HEIs and thus address the first research question. This section of the report is organized as follows: subsection two deals with the definitions of entrepreneurship ecosystems,and subsection three presents an operational definition of an EE for this research. Subsection four deals with the context of HEIs, subsection five deals with SSA, and subsection six provides a summary.

3.2 ▸ Definition of Entrepreneurship Ecosystems

This section delves into the definition of EE from the literature review. It is divided into three: an influential definition, a definition focusing on the regional perspective, and a definition focusing on the institutional perspective.

3.2.1 ▸ Definition of Entrepreneurship Ecosystems

The entrepreneurship ecosystem concept has gained traction because of the pioneering work of (Cohen, 2006; Isenberg, 2010; and Feldman et al., 2019). Several definitions of EE emerge from the literature review and are discussed below.

Cohen (2006) coined the term 'entrepreneurship ecosystem' and defined it as "an interconnected group of actors committed to sustainable development through the support and facilitation of new sustainable ventures" (p. 3). This definition focuses on the development of entrepreneurship within a specific geographical location. It emphasizes the "interconnectedness" of actors within that location and elements that support and facilitate the development of new businesses.

The definition emphasizes vital characteristics of

the EE and advances the concept of a 'systemic' view of entrepreneurship, emphasizing the importance of interaction between various elements of an Entrepreneurship System (ES). These include independent actors and factors enabling or limiting entrepreneurship within a territory (Stam & Ven, 2019).

Isenberg (2010) offers a second instrumental definition of EE, stating that an entrepreneurship ecosystem" consists of a set of individual elements – such as leadership, culture, capital markets, and open-minded customers – that interact in a complex manner." In addition, the author emphasized that disregarding the interconnected nature of ecosystem components can result in adverse outcomes (p. 50). The definition attempts to identify the individual components of an ecosystem in a way that acknowledges their independence and the complexity of their interdependence. While Isenberg's model can identify the ecosystem's components, the approach depicts a static state of the six identified domains. Isenberg further dissects these to identify enablers that can be used to trace network actors, but this increases the complexity of an enterprise environment.

"While maintaining the domain argument, Isenberg (2011) argued that "entrepreneurship, in order to be self-sustaining, requires an ecosystem, and an ecosystem requires proximity so that the different domains can evolve together and become mutually reinforcing." This argument asserts a rather complex relationship that is so 'interconnected' and 'intertwined' that a change in one domain has ripple effects in others. Additionally, all domains must co-evolve to become mutually exclusive. This may be difficult to achieve in practice since actors may be motivated by different objectives or evolve due to ecosystems changes.

Isenberg (2014) defined an ecosystem as "a dynamic, self-regulating network of many different types of actors". He also mentioned that "there are important connections and influencers who may not be entrepreneurs themselves" in every entrepreneurship hotspot. Despite advances in the domains approach, it is challenging to engage all network actors to ensure self-regulation, self-reinforcing, and self-sustaining entrepreneurship ecosystems, especially on a larger scale such as the regional or national level.

Mason and Brown (2014) define EE as "a collection of interconnected entrepreneurial actors (both potential and existing), organizations (e.g., firms, venture capitalists, business angels, and banks), institutions (universities, public sector agencies, and financial bodies), and processes (business birth

rate, rate of [high-growth firms], number of serial entrepreneurs and blockbuster entrepreneurs, and levels of entrepreneurial ambition and sell-out)." (p. 5). This definition appears to be exhaustive because it lists structural, dynamic, and institutional elements associated with entrepreneurial ecosystems in the literature but does not specify ecosystem outcomes. As a result, there is a need for a comprehensive definition that identifies the key actors, environmental factors, and the expected outcomes from the EEs.

EE scholars have proposed numerous other definitions over the years some of which focused on regional perspective while others focused on institutional perspective. These are discussed below:

3.2.2 Definition focusing on the Regional Perspective

The EE literature contains several definitions that emphasize a regional perspective. For instance, Aminova et al. (2020) defined the EE as "a purposeful network of dynamically interacting systems with an ever-changing set of dependencies within a given context." In addition, Nkusi et al. (2020) defined EE as a "community of many independent actors (governments, universities, investors, mentors, service providers, and companies) that can play a key role in the development of entrepreneurial activities in a given geographic area."

According to Kamanzi (2019), the EE is a "network of interconnected entrepreneurial actors, entrepreneurial institutions, and entrepreneurial processes that collaborate formally and informally to connect, mediate, and govern performance in the local entrepreneurial environment". According to Audretsch and Belitski, (2017), EE is a 'dynamic community of interdependent actors (entrepreneurs, suppliers, buyers, governments, and so on) and system-level institutional, informational, and socioeconomic contexts that interact via information technologies and networks to generate new ideas and more efficient policies.' The definition provided by Audretsch and Belitski (2017) is also consistent with (Mason & Brown, 2014) and (Kantis et al., 2012).

According to Stam (2014), EE is an 'interdependent set of actors that is governed in such a way that it enables entrepreneurial action'. Kantis et al. (2012) defined EE

as a network of interconnected actors within a specific area that includes at least the following building blocks: universities and research institutions, qualified human resources, formal and informal networks, governments, angel investors and venture capitalists, professional service providers, and an enterprising culture that connects all these factors openly and dynamically.

3.2.3 Definition focusing on Institutional Perspective

Some scholars have defined the EEs from an institutional standpoint. Some of these authors attempted to define EE through the lens of a higher education institution, coining the term University-Based Entrepreneurship Ecosystem (U-BEE).

According to Katja (2020), U-BEE refers to "strategic and collaborative actions of various organizational components to maximize the entrepreneurial and innovative contributions of universities."
Moreover, Acs et al. (2014) define EE as a "dynamic, institutionally embedded interaction between individuals' entrepreneurial attitudes, ability, and aspirations, which drives resource allocation via the creation and operation of new ventures."

According to Greene et al. (2010), a university is a multidimensional enterprise that encourages entrepreneurial thought and action to facilitate networking with relevant internal and external stakeholders. However, based on the review of the relevant literature, the U-BEE approach has not been adequately developed, as there is no clear analytical framework in the EE literature that explicitly links EE with HEIs.

Table 1 summarizes the definitions identified and classifies them under the following headings based on their application level: regional (geographic), institutional, actor, and broader definitions. A summary of the definitions' key characteristics, components, and context is provided. In addition, a definition that best connects the entrepreneurship ecosystems within HEIs is proposed.

Table 1

Summary of EE Definitions

#	Entrepreneurship Ecosystem Definitions	Author	Characteristics	Components	Context	Context
1	"The entrepreneurship ecosystem is a purposeful collaborating network of dynamically interacting systems with a constantly changing set of dependencies within a given context."	Aminova, Mareef and Machado, (2020)	Purposeful, Collaborating Network, Interaction-Dependent	Interacting Systems, Networked, Context-Dependent	Regional (Multi-Country, Arab World, Across 22 Countries)	League of Arab States; Algeria, Bahrain, Comoros, Djibouti, Egypt, Jordan, Iraq, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, Yemen
2	"EE is a network of interconnected entrepreneurial actors, entrepreneurial institutions, and entrepreneurial processes that work together formally and informally to connect, mediate, and govern performance in the local entrepreneurial environment."	Kamanzi, (2019)	Interconnectedness, Formal and Informal, Connection, Mediation, And Governance Performance.	Entrepreneurial Actors, Institutions, And Processes	Local Environment	Uganda
3	"A combination of social, political, economic, and cultural elements within a region that supports the development and growth of innovative start-ups and encourages nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures."	Spigel, (2017)	Supporting, Encourage Risk Taking	Social, Political, Economic, And Cultural Elements, Funding, Innovative Start-Ups, Nascent Entrepreneurs	Regional	Canada

#	Entrepreneurship Ecosystem Definitions	Author	Characteristics	Components	Context	Context
4	"Entrepreneurial Ecosystems (EE) consist of interacting components, which foster new firm formation and associated regional entrepreneurial activities."	Mack and Mayer, (2016)	Interactive, Fostering	New Firms, Regional Entrepreneurial Activities	Regional	Phoenix, Arizona
5	"Those economic, social, institutional and all other important factors that interactively influence the creation, discovery and exploitation of entrepreneurial opportunities."	Qian et al., (2012)	Interactive, Creating, Discovering, Exploitation	Economic, Social and Institutional Factors, Entrepreneurial Opportunities	Regional	United States
6	"EE is a community consisting of many independent actors (governments, universities, investors, mentors, service providers, companies) that can play a key role in the development of entrepreneurial activities for a given geographical area."	Nkusi et al., (2020)		Independent Actors, Entrepreneurial Activities	Geographical Area	Rwanda
7	"An interactive community within a geographic region, composed of varied and interdependent actors (e.g., entrepreneurs, institutions and organisations) and factors (e.g., markets, regulatory framework, support setting, entrepreneurial culture), which evolves over time and whose actors and factors coexist and interact to promote new venture creation."	Vogel, (2013)	Interactive, Coexistence, Evolving	Community, Independent Actors, New Ventures	Geographical Region	Indonesia

#	Entrepreneurship Ecosystem Definitions	Author	Characteristics	Components	Context	Context
8	"A set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organisations (e.g. firms, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial bodies) and entrepreneurial processes (e.g. the business birth rate, numbers of high growth firms, levels of 'blockbuster entrepreneurship', number of serial entrepreneurs, degree of sell-out mentality within firms and levels of entrepreneurial ambition) which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment."	Autio and Levie, (2017)	Interconnectedness, Mediating, Governing, Formal and Informal	Entrepreneurial Actors, Organisations, Institutions, Processes, Serial Entrepreneur	Local Entrepreneurial Environment	Scotland

This definition is the most specific in terms of its explicit focus on new venture creation, but consequent system-level benefits are not elaborated. |
| 9 | "A dynamic community of interdependent actors (entrepreneurs, supplies, buyers, government, etc.) and system-level institutional, informational and socioeconomic contexts … interact via information technologies and networks to create new ideas and more efficient policies." | Audretsch and Belitski, (2017) | Dynamic, Interdependency | Dynamic Community, Interdependent Actors, Systems Level Institutional, Informational, And Socioeconomic, Information Technology | Institutional -Informational and Socioeconomic Context | 70 European cities |
| 10 | "Ecosystems consist of a set of different interconnected actors within a specific area, which includes at least the following building blocks: universities and R&D institutions, qualified human resources, formal and informal networks, governments, angel investors and venture capitalists, professional service providers and an enterprising culture, which connects all of these factors in an open and dynamic way." | Kantis et al., (2012) | Interconnectedness, Formal and Informal, Enterprising Culture, Open and Dynamic | Actors, Building Blocks E.G., Universities, and R&D, Government | Within A Specific Area/Region | Zimbabwe |

#	Entrepreneurship Ecosystem Definitions	Author	Characteristics	Components	Context	Context
11	"A set of interconnected entrepreneurial actors (both potential and existing), organizations (e.g., firms, venture capitalists, business angels and banks), institutions (universities, public sector agencies and financial bodies), and processes (business birth rate, rate of [high-growth firms], number of serial entrepreneurs and blockbuster entrepreneurs, and levels of entrepreneurial ambition and sell-out mentality in the society)"	Mason and Brown (2014)	Interconnectedness	Entrepreneurial Actors, Institutions, Organisations, And Processes	Actors	Denmark

This definition lists structural, dynamic and institutional elements attributed to entrepreneurial ecosystems in the literature but does not specify ecosystem outcomes. |
12	"An entrepreneurial ecosystem is an interdependent set of actors that is governed in such a way that it enables entrepreneurial action."	Stam (2014)	Interdependent, Entrepreneurial Action	Actors, Entrepreneurial Actions	Actors/Institutions	Netherlands
13	"An interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures"	Cohen (2006)	Interconnected, Sustainability, Supportive	Group Of Actors, New Sustainable Ventures	Local Geographical Community	United States
14	"Entrepreneurial ecosystems represent a diverse set of inter-dependent actors within a geographic region that influence the formation and eventual trajectory of the entire group of actors and potentially the economy as a whole ... Entrepreneurial ecosystems evolve through a set of interdependent components, which interact to generate new venture creation overtime."	Cohen (2006)	Diversity, Interdependency, Interacting	Group Of Actors, Interdependent Components, New Ventures	Geographic Region	United States

#	Entrepreneurship Ecosystem Definitions	Author	Characteristics	Components	Context	Context
15	"Entrepreneurial system consists of a complexity and diversity of actors, roles, and environmental factors that interact to determine the entrepreneurial performance of a region or locality."	Spilling, (1996)	Complexity, Diversity, Interactive	Actors, Environmental Factors, Entrepreneurial Performance	Region Or Locality	Norway
16	"The entrepreneurial ecosystem is defined as the close relationship that exists between individuals, the government and its affiliated institutions, and other influential components to support entrepreneurial activity in a specific geographical area."	Meigounpoory et al., (2019)	Relational, Supporting	Individuals, Governments, Affiliated Institutions, Influential Components, Entrepreneurial Activity	Geographical Area	Conceptual Paper
17	"A set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory."	Stam and Spigel, (2016)	Interdependency, Coordination, Productive	Interdependent Actors and Factors, Productive Entrepreneurship	Territorial	Pakistan
18	"The community of organisations, institutions and individuals that impact the enterprise and the enterprise's customers and supplies."	Teece, (2007)	Communal, Impacting	Community Of Organisations, Institutions, and Individuals	Actors	Conceptual Paper
19	"Set of entrepreneurial actors including potential customers and suppliers, universities and research centres, social and cultural operators, institutions and policy makers, large companies, innovative start-ups and entrepreneurs, experts and professionals, investors, and a pool of talented people."	Elia et al., (2020)	Collective	Entrepreneurial Actors E.G., Customers and Suppliers, Institutions, Policy Makers, Large Companies, Start-Ups, and Entrepreneurs	Actor Network	United states

#	Entrepreneurship Ecosystem Definitions	Author	Characteristics	Components	Context	Context
20	"The community of organisations, institutions and individuals that impact the enterprise and the enterprise's customers and supplies."	Kabbaj et al., (2016)	Communal, Impactful	Organisations, Institutions, Individuals, Enterprise's Customers and Suppliers	Community	Morocco
21	"...dynamic, institutionally embedded interaction between entrepreneurial attitudes, ability, and aspirations by individuals, which drives the allocation of resources through the creation and operation of new ventures."	Acs et al., (2014))	Dynamic, Institutional Embeddedness, Interactive, Entrepreneurial Attitudes, Ability, Aspirations	Individual, Resources, New Ventures	Institutional	United States
22	"EE consists of a set of individual elements -such as leadership, culture, capital markets, and open-minded customers-that combine in complex ways."	Isenberg, (2010)	Complexity, Autonomy	Individual Elements such as Policy, Finance, Culture, Support, Human Capital and Markets	Elements	United States
23	"University-Based Entrepreneurial Ecosystem (U-BEE) refers to the strategic and collective actions of various organisational components aimed at maximising universities' entrepreneurial and innovative contributions."	Katja, (2020)	Strategic, Collectiveness	Organisational Components (Infrastructure, Culture, Leadership Etc.)	Institutional	Finland
24	"A university-based entrepreneurial ecosystem is defined as "multidimensional enterprises that support entrepreneurship development through a variety of initiatives related to teaching, research and outreach."	Greene et al., (2010)	Multidimensional	Enterprises, Teaching, Research, Outreach	Institutional	United Kingdom

#	Entrepreneurship Ecosystem Definitions	Author	Characteristics	Components	Context	Context
25	"A dynamic community of interdependent actors (entrepreneurs, suppliers, buyers, government) and institutional, informational, and socioeconomic contexts."	Wagner et al., (2019)	Dynamic, Communal	Interdependent Actors E.G., Entrepreneurs, Suppliers, Buyers, Government	Institutional, Informational, And Socioeconomic Contexts	Germany
26	"Coordinated attempts to establish environments that are conducive to the probabilities of success for new ventures following their launch … entrepreneurial ecosystems are focused on creating environments conducive to the success of entrepreneurs and their new ventures."	Kuratko et al., (2017)	Coordinated Attempts, Conducive	New Ventures Conducive Environment	Environment (Multiple)	India
27	"Entrepreneurial ecosystem is a multidimensional set of interacting factors that moderate the effect of entrepreneurial activity on economic growth."	Bruns et al., (2017)	Multidimensional, Interactive	Factors, Entrepreneurial Activity, Economic Growth	Regional	107 European regions
28	"Self-organised, scalable, sustainable, and interactive environments involving entrepreneurial attitudes, abilities and aspirations of individuals, which are committed to carry out the entrepreneurial action."	Autio and Levie, 2017)	Self-Organised, Scalable, Sustainable, and Interactive	Entrepreneurial Attitudes, Abilities, and Aspirations of Individual Actors, Entrepreneurial Action	Institutional	Scotland

Note

3.3 An Operational Definition of EEs in HEI for this Research

From the analysis of the definitions reviewed above, the main categories of an EE can be described as a set of dynamic network of actors existing in supportive environments where they are connected and context-dependent; systems directed towards specific purposes through carrying out specific entrepreneurial processes; entrepreneurial activities that depend on a set of factors and infrastructure existing within an overarching macro environment - cultural, economic, informational, institutional, political and social, and within African HEIs enabled through their functions/aims, which are considered as aspirations due to their evolving nature.

The authors proposed the following statement as the definition of EEs for the purpose of this study by combining the major themes from the reviews of definitions and highlighting some of the subthemes:

"The strategic and collaborative actions of various interconnected institutional and external actors, programs, and activities, aimed at optimizing students, staff, and collaborators' innovative and entrepreneurial competencies and attitudes and achieving the HEI's entrepreneurial aspirations" (Authors, 2022)

3.4 Higher Education Institutions (HEIs)

This term is used globally to designate organizations providing higher, post-secondary, tertiary, and/or third-level education (Kanamaru, 2004). They include traditional universities and other profession-oriented institutions. Higher education institutions (HEIs) also include teacher-training schools, junior colleges, and institutes of technology (Chinta et al., 2016). HEIs are essential in promoting lifelong learning (LLL). They have a unique capacity to develop skills and foster knowledge and have the potential to mobilize educational resources and provide learning opportunities for diverse populations.

3.4.1 Context of HEIs

Researchers examining trends in higher education agree that the dramatic changes of the late 20th century and early 21st century are unparalleled (Phillips et al., 2009). In particular, the challenges associated with the increasing demand that post-secondary education be provided to larger and increasingly diverse segments of society have arguably resulted in over-burdened and under-funded systems that have been unable to cope with demand. This has resulted in higher education becoming a competitive enterprise at every level of operation (Phillips et al., 2009). At the same time, the increasingly diverse student body (including, for example, those from socio-economically disadvantaged backgrounds, mature-age students, and students with disabilities) has created pressures for higher education providers to implement a range of support mechanisms, often with minimal funding and/or resources. This highly competitive and under-resourced educational environment is situated in an increasingly competitive worldwide economy and a social context that encourages students to regard higher education as a vocational end.

While the higher education sector has enormous potential for promoting lifelong learning, its contribution is far from realized. Many universities prioritize academic excellence and research, with less attention paid to EEs and participation in learning opportunities. Achieving the vision expressed through the UN Sustainable Development Goals (SDGs) and the broader agenda of AU 2063—as precisely articulated in UN SDG 4 and AU Agenda 2063, Goal 2—requires substantially transforming HEIs into EEs.

Globally, HEIs have undergone radical changes because of internationalization and technological revolutions. They expect appropriate reporting mechanisms to be in place to avoid conflict, facilitate collaboration, and increase productivity (Roy & Marsafawy, 2020). Much depends on the structure of HEIs to meet the needs of stakeholders, align with best practices globally, and overcome the challenges of complying with the requirements of various regulatory bodies at the local, regional, and international levels (Roy & Marsafawy, 2020).

To ensure the effectiveness of academic and administrative functions, HEIs are governed by several centers and offices such as Quality Assurance, Research & Community Engagement, Admission and Registration, Student Services, Information Technology, Library, Human Resources, Finance, etc. Standard practices in HEIs include ensuring effective educational provision, quality assurance and enhancement, an appropriate reporting mechanism, national and international collaboration, and conflict avoidance (Hansen, 2016).

The expectations of stakeholders, as well as the requirements of accreditation and regulatory bodies, vary greatly and are heavily influenced by contextual factors. To gain a competitive advantage. HEIs focus on benchmarking with international best practices in academics, quality assurance, and strategic planning (Colyvas et al., 2002).

The organizational structure of HEIs reflects the strategic and long-term goals of achieving sustainability, promoting innovation and entrepreneurship, connecting impact and quality, measuring institutional performance indicators, and collaborating with national and international bodies (Kravchenko et al., 2020). This organizational structure is now adapting to new environmental challenges by restructuring governance and management to ensure accountability (Shariffuddin et al., 2017).

With this background, the study evaluated the literature to understand how HEIs promote innovation and entrepreneurship. The study focused on understanding the HEIs and how African institutions are faring in developing their EEs to attain their entrepreneurship aspirations.

3.5 Sub-Saharan Africa (SSA)

Sub-Saharan Africa is, geographically, the area and regions of the continent of Africa that lies south of the Sahara (World Bank, 2015). These include West Africa, East Africa, Central Africa, and Southern Africa. Geopolitically, in addition to the African countries and territories situated entirely in that specified region, the term may also include polities that only have part of their territory located in that region, per the definition of the United Nations (UN) (Hartmann, 2016). This is considered a non-standardized geographical region, with the number of countries included varying from 46 to 48 depending on the organization describing the region (e.g., UN, WHO, World Bank, etc.). The African Union uses a different regional breakdown, recognizing all 55 member states on the continent and grouping them into five distinct and standard regions.

However, while they are also member states of the Arab League, the Comoros, Djibouti, Somalia, and Mauritania (and sometimes Sudan) are all geographically considered part of Sub-Saharan Africa (Hartmann, 2016). Overall, the UN Development Programme applies the "Sub-Saharan" classification to 46 of Africa's 55 countries, excluding Djibouti, SADR, Somalia, and Sudan (UNDP, 2020) Only seven African countries are not geopolitically a part of Sub-Saharan Africa: Algeria, Egypt, Libya, Morocco, Tunisia, Western Sahara (claimed by Morocco) and Sudan; they form the UN sub-region of Northern Africa, which also makes up the largest bloc of the Arab World.

This project adopted the UN definition of SSA used by The Education Collaborative at Ashesi University.

3.6 Section Summary

This section has outlined the various definitions in the literature on entrepreneurship ecosystems (EE). The review has presented multiple definitions, beginning with the most influential ones from Cohen (2006), Isenberg (2010), and Feldman et al. (2019), who are credited with leading the field's development and debates. As presented, the various definitions reflect the various conceptualizations of the ecosystems of entrepreneurship.

While there is no doubt about the systemic approaches used by different scholars to define EE, what is clear is the various levels at which the concept is applied. Some scholars approach EE from a regional or

geographic perspective, explaining the idea based on the 'interconnected,' 'interrelated,' 'intertwined,' 'interactive,' and 'interdependent nature of different 'institutions,' elements, actors, or communities within a specific geographical space or location. Another group of scholars has taken a meso perspective, defining EE in terms of institutional context, viewing EE as a network of interconnected actors with organizations, institutions, or firms. Finally, another group of researchers defines EE from a micro perspective, emphasizing the level of involvement of individual actors or elements.

Although there is no agreement on the best definition, as evidenced by the various arguments, he most

significant development is a better understanding of EE and how it can achieve desired outcomes. Therefore, scholars, practitioners, and policymakers must be clearly define and operationalize EE to consistently and authoritatively drive the desired outcomes. Additionally, the report provides an overview of HEI, its context, the SSA, and how it is defined and used in this study.

4.0

Conceptual
Framework
Development

4.1 ▸ Review of Existing Entrepreneurship Ecosystem Models

After proposing an operational definition of EEs for HEIs within SSA, the corresponding conceptual framework that will work in tandem with the operational definition was required. Specifically, this was done to address the research objective three. This section of the report aims to document existing models used in the study of entrepreneurship ecosystems to aid in proposing an alternative that that applies to the analysis and synthesis of the EEs of HEIs in SSA.

This review will serve as a basis to understand the current literature on EEs. It will present an appropriate model that describes EEs within HEIs to EE for this project, coupled with the operational definition.

4.1.1 ▸ Isenberg's Model

Isenberg (2011) developed what is known as the 'entrepreneurship ecosystem' model for economic development. The model presents six domains within the entrepreneurship ecosystem: a conducive culture, enabling policies and leadership, availability of appropriate finance, quality human capital, venture-friendly markets for products, and a range of institutional supports (Isenberg, 2010). Isenberg claims that each context requires its ecosystem, as the components of the system include several units and pieces that interact in different distinctive ways based on the context of the entrepreneurship activities. The Isenberg model can be applied to an industry-specific cluster, an evolving single industry, or industries, geographically bound to a specific geographical scale, such as campus, city, and region. However, the Isenberg model has been criticized for being more of a descriptive model than a diagnostic model of the entrepreneurial ecosystem it describes (Mason & Brown, 2014).
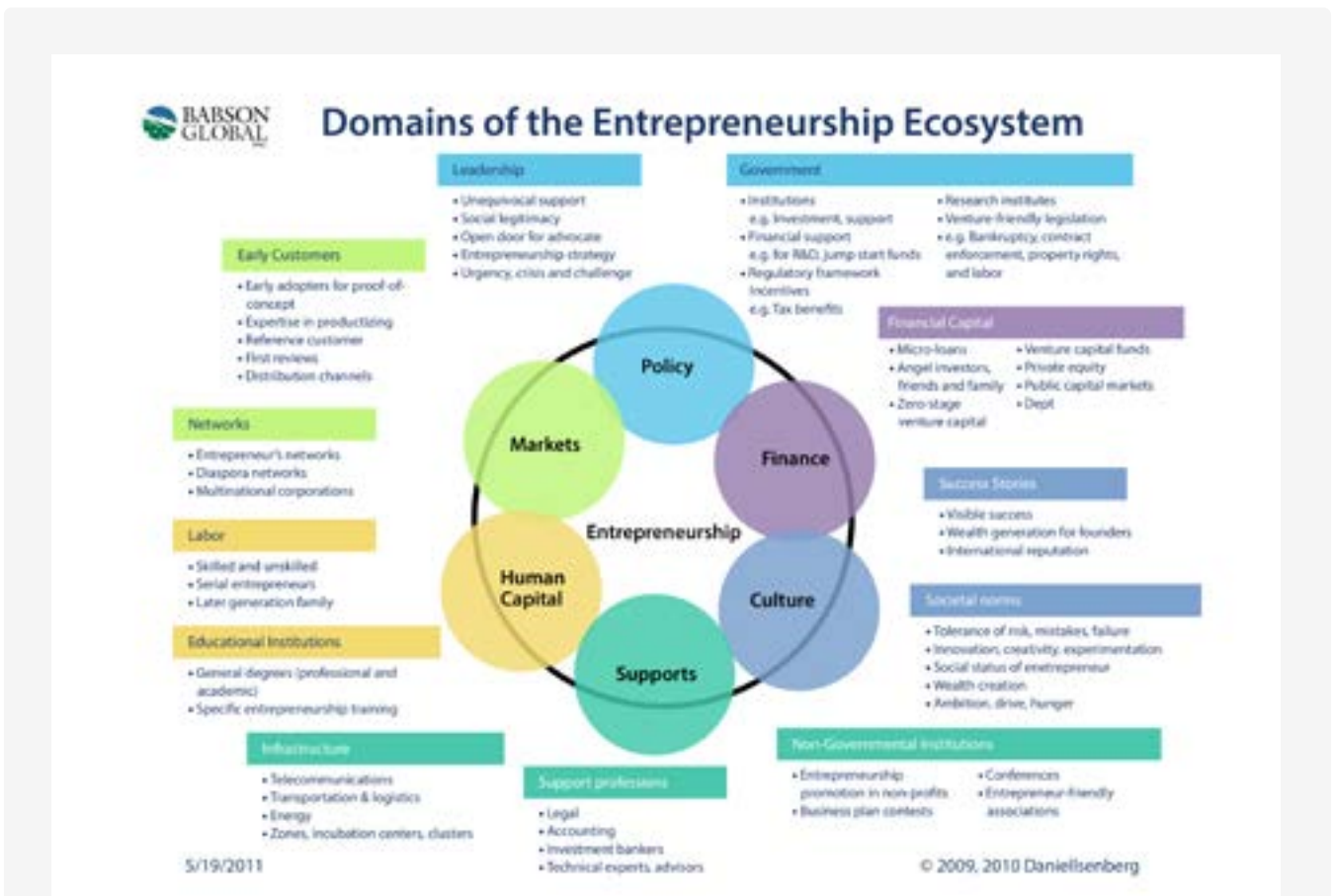
Figure 2. Isenberg Entrepreneurship Ecosystem Model.

4.1.2 World Economic Forum Model

The World Economic Forum (WEF) model considers six domains of entrepreneurial ecosystems, like Isenberg's: policy, finance, culture, support, human capital, and markets. However, WEF identifies two more factors—education and training and having a major university as a catalyst—as pillars for consideration in the development of the EE. The model identifies the pillars of the entrepreneurship ecosystem that are important to the development of entrepreneurs and the growth/success of their businesses. The WEF model is criticized for being descriptive, though it can aid in case studies and matrix development (Delivorias, 2016). This is because the WEF model examines institutions on different levels and how each institution plays a unique role in the development of the EE. However, since the model emphasizes a global perspective over institutions, it cannot be ideal for HEIs' conceptualization, mainly where the focus is the contextual dynamics within the HEI. The model still requires empirical testing and validation of the identified pillars (World Economic Forum, 2013).

COMPONENTS OF ENTREPRENEURIAL ECO-SYSTEM PILLARS

Accessible Markets
- Domestic Market - Large Companies as Customers
- Domestic Market - Small/Medium Companies as Customers
- Domestic Market - Governments as Customers
- Foreign Market - Large Companies as Customers
- Foreign Market - Small/Medium Companies as Customers
- Foreign Market - Governments as Customers

Human Capital/Workforce
- Management Talent
- Technical Talent
- Entrepreneurial Company Experience
- Outsourcing Availability
- Access to Immigrant Workforce

Funding and Finance
- Friends and Family
- Angel Investers
- Private Equity
- Venture Capital
- Access to Debt

Support System
- Mentors/Advisors
- Professional Services
- Incubators/Accelerators
- Network of Entrepreneurial Peers

Regulatory Framework and Infrustructure
- Ease of Starting a Business
- Tax Incentives
- Business-Friendly Legislation/Policies
- Access to Basic Infrastructure (e.g. water, electricity)
- Access to Telecommunications/Broadband
- Access to Transport

Education and Training
- Available Workforce with Pre-University Education
- Available Workforce with University Education
- Entrepreneur-Specific Training

Major Universities as Catalysts
- Major Universities Promoting a Culture of Respect for Entrepreneurship
- Major Universities Playing a Key Role in Idea-Formation for New Companies
- Major Universities Playing a Key Role in Providing Graduates for New Companies

Cultural Support
- Tolerance of Risk and Failure
- Preference for Self-Employment
- Success Stories/Role Models
- Research Culture
- Positive Image of Entrepreneurship
- Celebration of Innovation

Figure 3. World Economic Forum Entrepreneurship Ecosystem.

4.1.3 Global Entrepreneurship Monitor

Global Entrepreneurship Monitor (GEM) is a national diagnostic tool that provides a framework and data to analyze nearly any subnational ecosystem. Its emphasis on individual (human) entrepreneurial behaviors is best suited to providing a broader perspective on societal attitudes and perceptions of entrepreneurship, entrepreneurs, and entrepreneurial businesses. The model recognizes the environment in which entrepreneurial activities occur by collecting data on individual attitudes, perceptions, and intentions set within a social, cultural, and political context that may support or constrain decisions to start a business. However, the model is not ideal for measuring EE at the institutional level since the model is measurable at the national level for measuring the national innovation system, using individual-level cross-sectional surveys.

GEM is a measure that provides entrepreneurship indicators that are primarily measured by self-employment and total early-stage activity at the national level. Finally, the model fails to identify and recognize the impact of "Gazelles," a term coined in the 1980s by David Birch that referred to young, fast-growing, rapidly rising sales and rapidly expanding workforce firms. Although the GEM model can diagnose the EE, it cannot be used to conceptualize EE within African HEIs, as it does not consider the actual HEIs activities and the ability to influence the decisions to pursue self-employment and business management. The HEIs' activities are various initiatives designed to achieve the stated goals. As a result, HEI activities should optimize students', staff's, and collaborators' innovative and entrepreneurial competencies and attitudes to achieve the HEI's entrepreneurial aspirations.
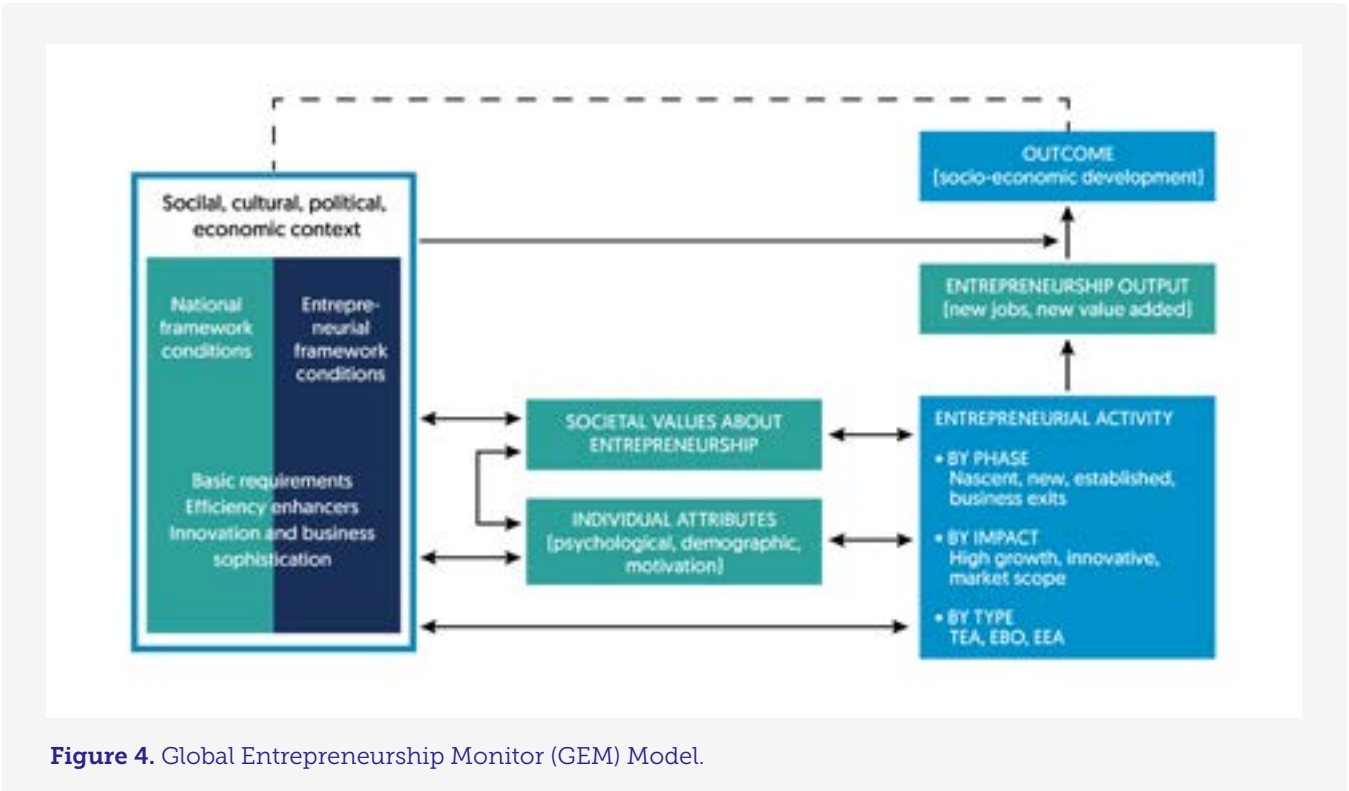
Figure 4. Global Entrepreneurship Monitor (GEM) Model.

4.1.4 Triple Helix, Quadruple Helix, and Quintuple Helix Models

The Triple Helix Model discusses the role of HEIs within the entrepreneurship ecosystem and positions them as enablers. The model advocates explicitly strengthening the collaborative relationships between academia, industry, and government to improve innovation (Farinha & Ferreira, 2012). The original Triple Helix model was heavily criticized and has since evolved into the Quadruple Helix model, which includes community/civil society and describes. ecosystems nationally.

However, it is frequently criticized for being theoretically ambiguous, even though it identifies factors that can guide the matrix's development. The Triple Helix is not a suitable model in a region where universities lack adequate infrastructure and knowledge capacities. Thus, it may not be appropriate to consider HEIs in Africa, which is a developing market context (Razak & White, 2015).
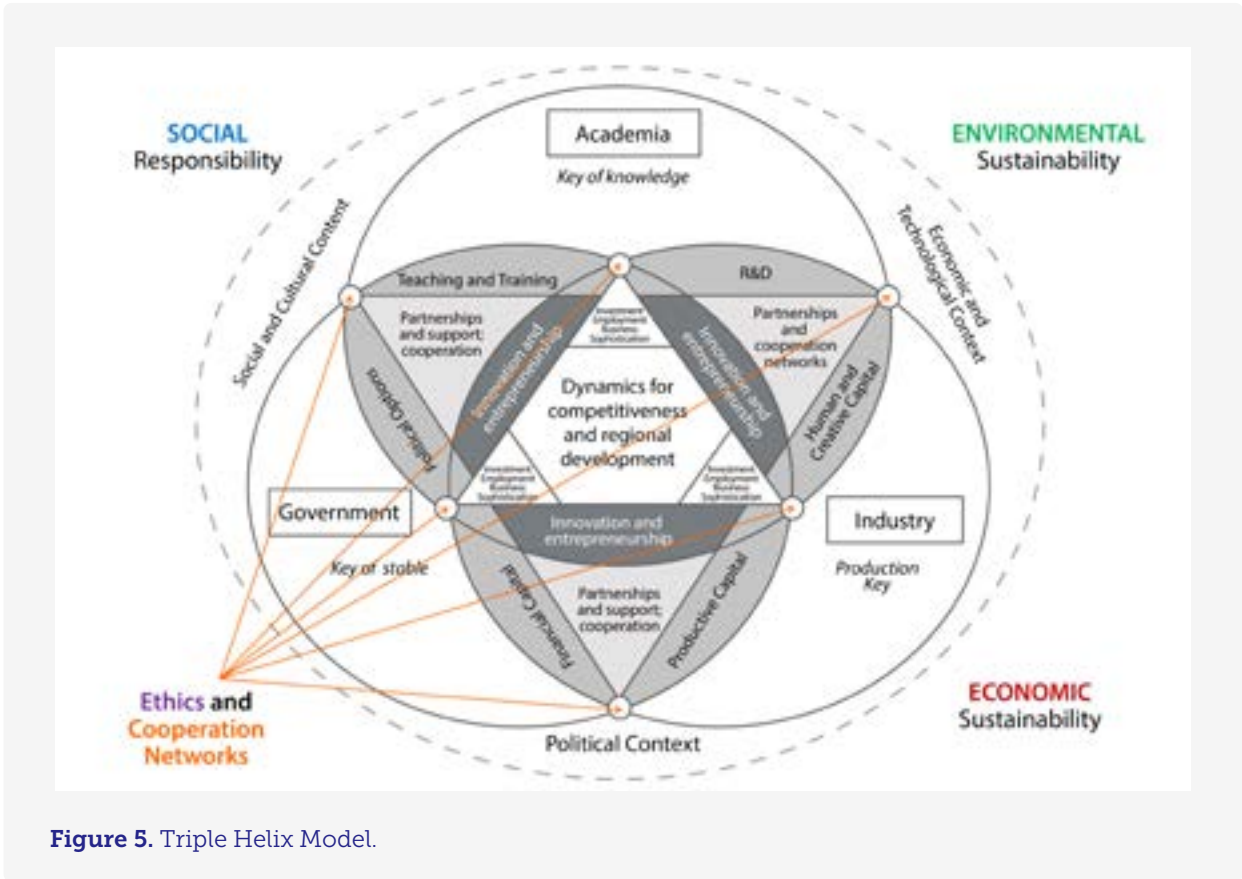
Figure 5. Triple Helix Model.

The Quadruple Helix model is an extension of the Triple Helix model that considers the inclusion of society and non-governmental institutions in the ecosystem (Farinha & Ferreira, 2012). The roles identified go beyond the focus on linkages in the extant Triple Helix research by emphasizing the Quadruple Helix's active role in developing process innovations and carrying individual and structural perspectives on entrepreneurship. The Quadruple Helix model of innovation activities allows for a broader range of innovations than the Triple Helix model. The Quadruple Helix Model recognizes the importance of non-profit actors and areas in addition to public, private, and academic actors and areas.
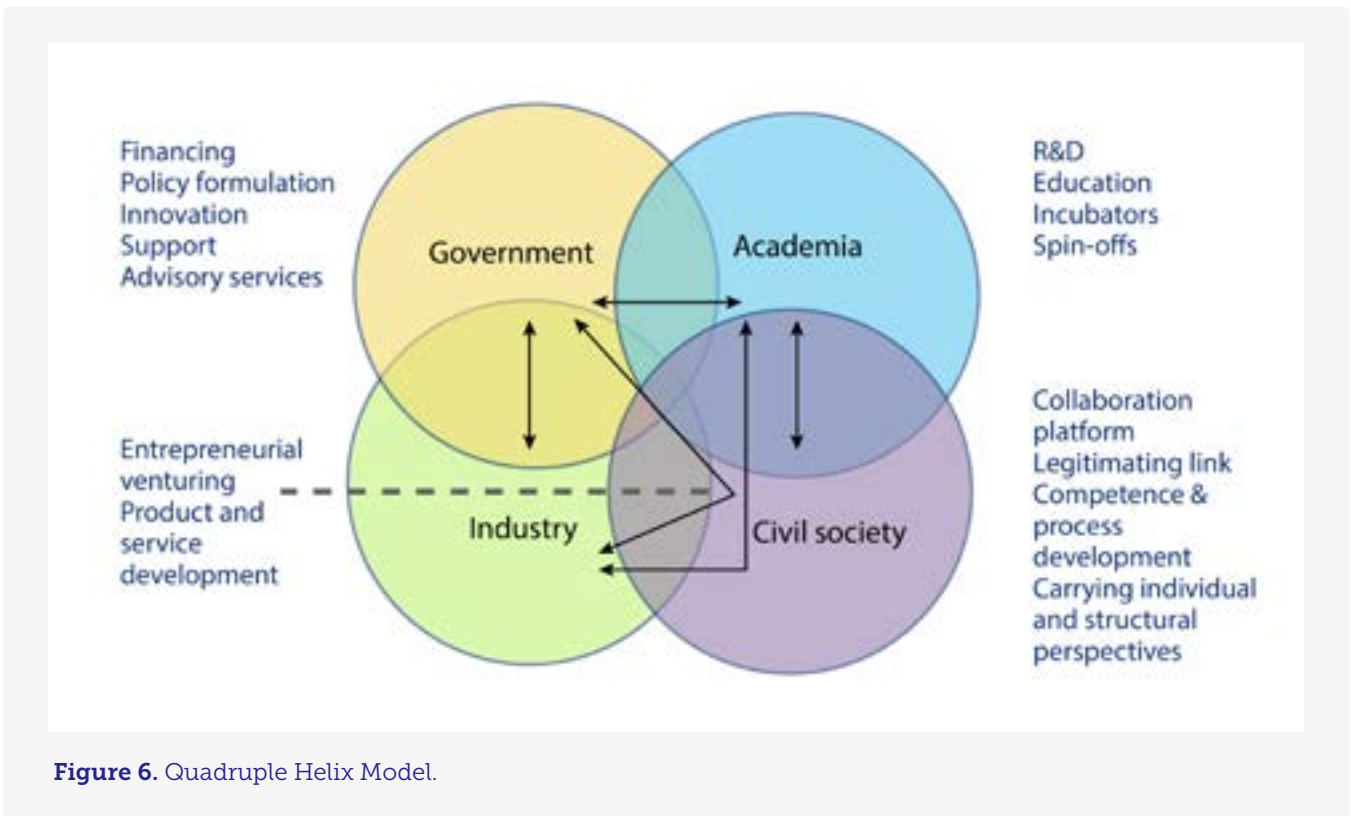
Figure 6. Quadruple Helix Model.

The approach of the Quintuple Helix model is based on the concept of an advanced knowledge system: the knowledge society and knowledge democracy perspectives for knowledge production and innovation. Some knowledge (i.e., innovation) modes will undoubtedly fade away and cease to exist. As a result, the model allows for and emphasizes the coexistence and co-evolution of various knowledge and innovation paradigms (Carayannis et al., 2018). Societal and economic natural environments should

be viewed as drivers of knowledge production and innovation, thereby defining opportunities for the knowledge economy. The model describes how a Triple Helix architecture can be embedded and contextualized within a more extensive Quadruple Helix architecture (Carayannis & Campbell, 2010). The entrepreneurial activities of universities within the African HEI context must align with the developmental agenda; therefore, the Quintuple Helix model fits in.

Figure 7. Quintuple Helix Model.
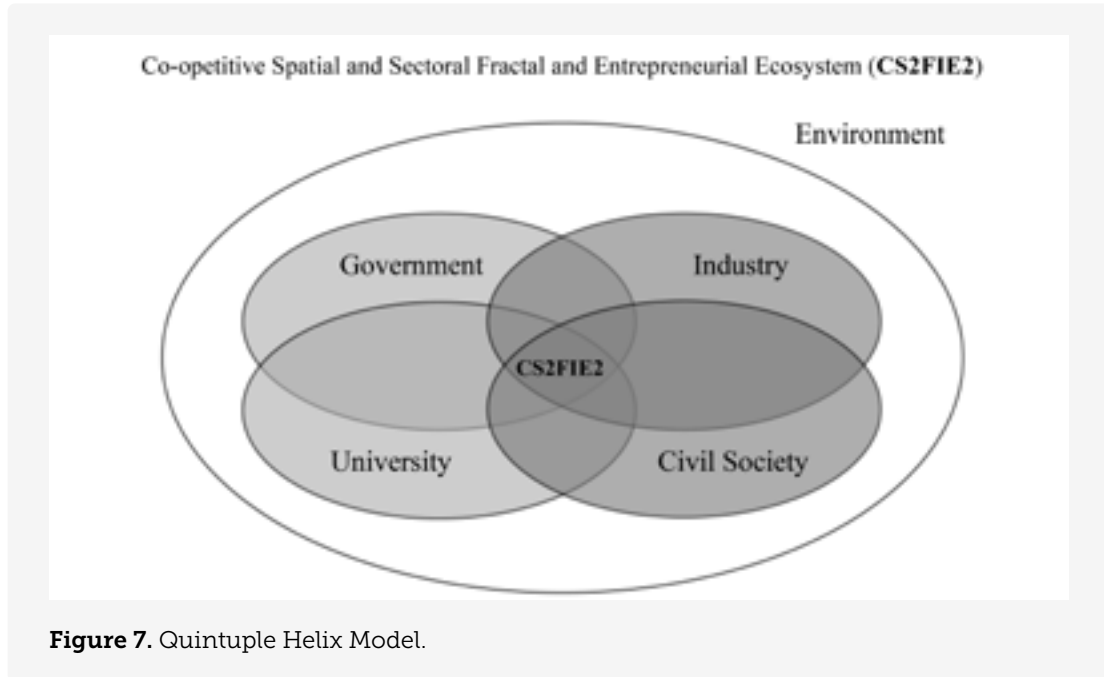
4.1.5 ▸ Koltai's Entrepreneurship Ecosystem Model (2014)

Steven Koltai developed a model which comprises six pillars (Identify, Train, Connect & Sustain, Fund, Enable, and Celebrate) and the six types of ecosystem actors (NGOs, Foundations, Academia, Investors, Government, and Corporations). Koltai emphasises the importance of these factors interacting to create a conducive environment for entrepreneurship. To develop entrepreneurs, Koltai's model relies on the

interaction of these factors and actors, but it considers an EE from the perspective of a hub and developing entrepreneurs rather than from the perspective of HEIs. Koltai (2014) thus would not directly apply to the HEIs-in-Africa context. However, the identified actors and factors are relevant in contextualizing a model for the SSA HEI EEs.

Figure 8.
Koltai's Entrepreneurship Ecosystem Model.
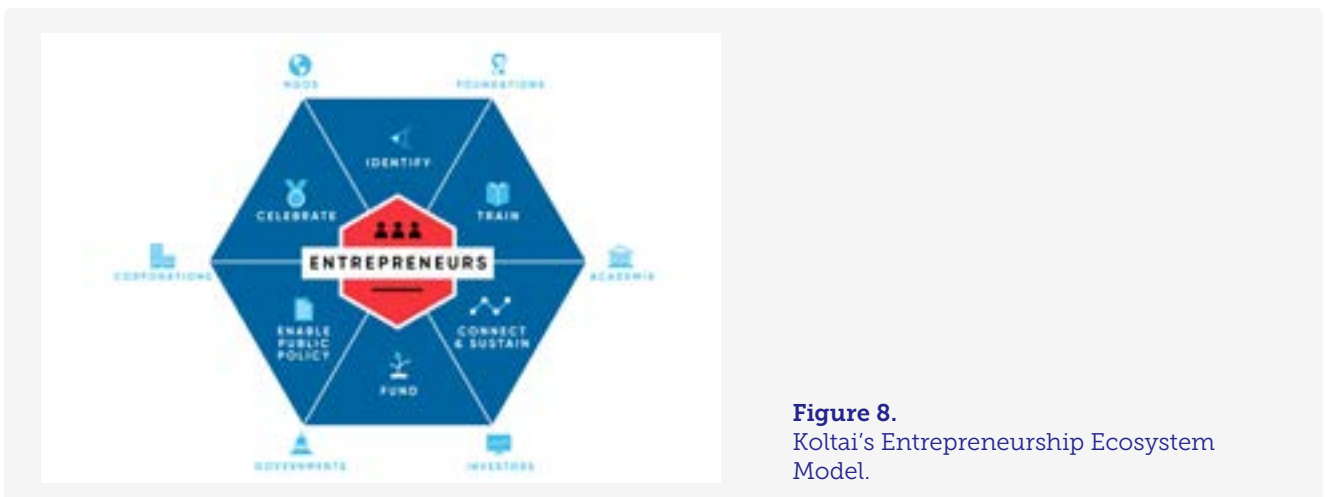
4.1.6 Mukesh and Pillai Entrepreneurship Ecosystem Model

The proposed model considered program context, internal factors, and broader HEIs' ecosystems. The entrepreneurship education dimensions consider the curriculum, extracurricular activities, department philosophy on entrepreneurship, student orientation, student capability, and mentoring and coaching. The HEI internal factors are human capital, financial capital, social capital, physical capital, status, and prestige, while the general ecosystem environment focuses on the general policies that support EE, such as entrepreneurial organization and governance structures, support measures for entrepreneurship, attitudes towards entrepreneurship, role models, and reward systems.

Although the model successfully identified and redefined the critical elements of the internal HEI entrepreneurship education ecosystem, the internal factors, and external aspects, it has yet to identify the institutional outcomes expected of such an EE. Furthermore, the model does not clearly outline the main activities that most HEIs have decolonized, namely interconnection in teaching, innovation, research, and community engagement. As a result, the model is only applicable to university-level education.
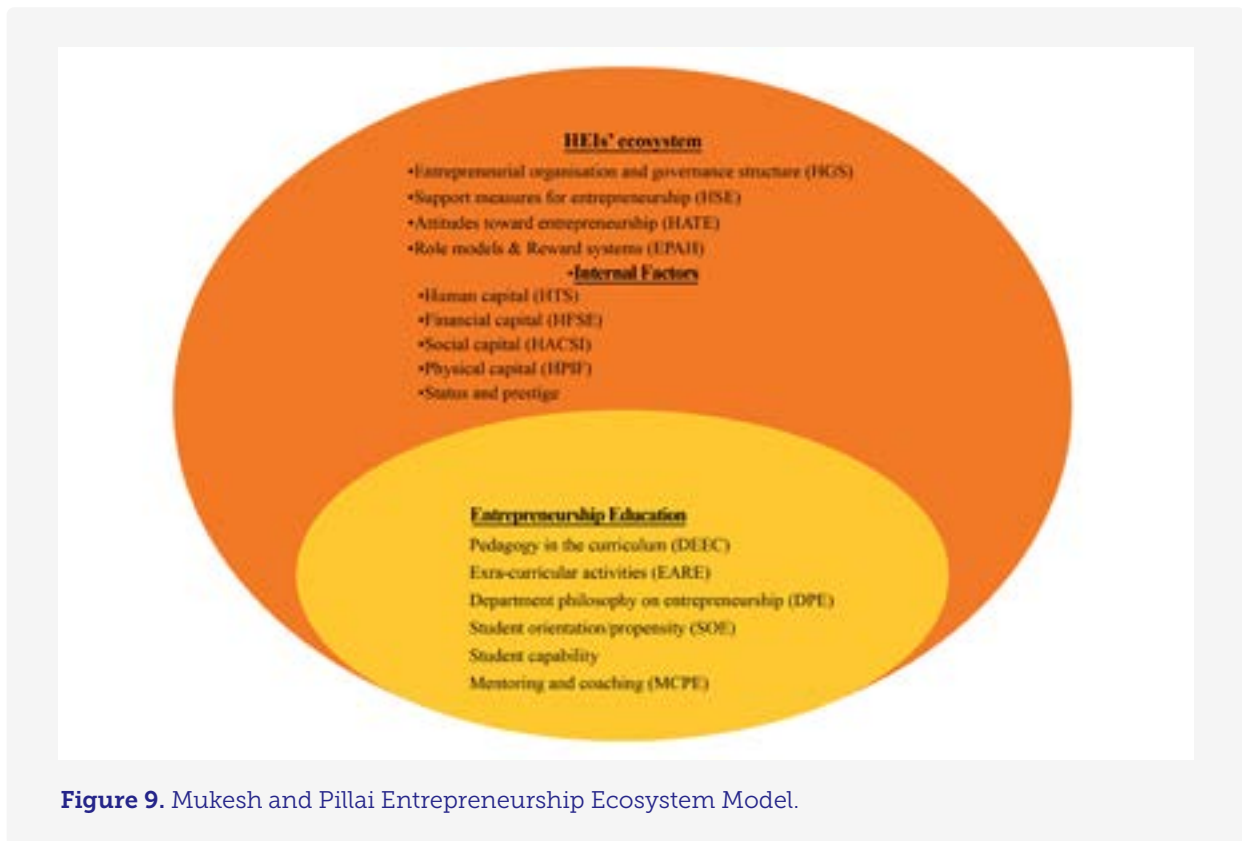
Figure 9. Mukesh and Pillai Entrepreneurship Ecosystem Model.

4.1.7 Khattab and Magli Entrepreneurship Ecosystem Model

Khattab and Al-Magli (2017) proposed an Integrated Model of the entrepreneurship ecosystem that includes media organizations, education, and training. Although the model identifies a comprehensive list of important EE actors, it recognizes that each player has cultural attributes that might influence their integration and their perception of entrepreneurs. Therefore, the model can only be moderately considered since it

does not focus solely on education, the perspective of HEIs (Khattab & Al-Magli, 2017) in the African context. Furthermore, the model is unclear on the entrepreneurial agendas of HEIs, particularly as it cannot demonstrate whether HEIs are solely engaged in research and teaching, teaching only, or operate as developmental institutions.
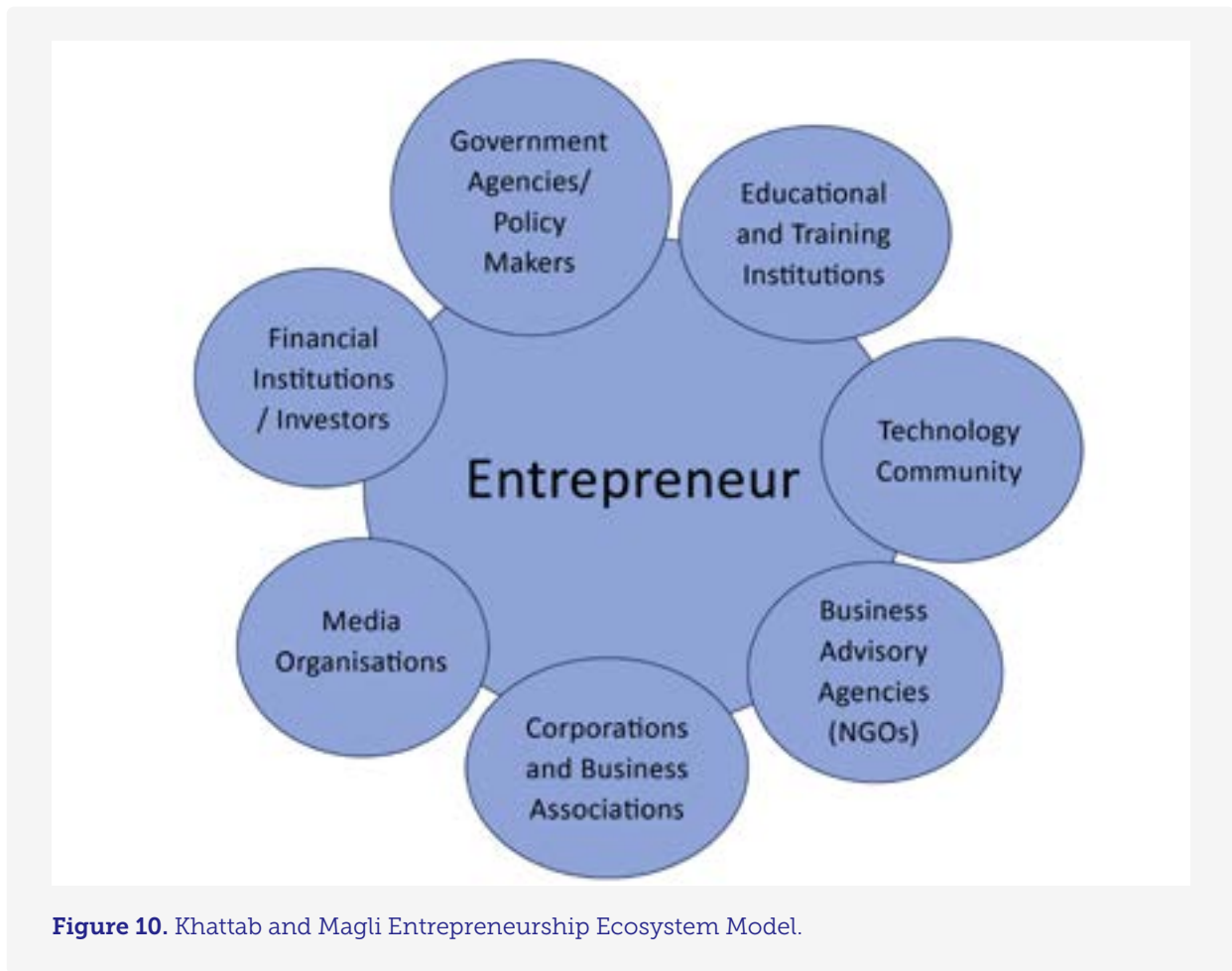
Figure 10. Khattab and Magli Entrepreneurship Ecosystem Model.

4.1.8 Multidimensional Entrepreneurial Ecosystem Scale Model (MEES)

MEES considers entrepreneurial ecosystems at the local level using six domains identified by Isenberg—policy, finance, culture, supports, human capital, and markets—as well as two guiding principles, i.e., applicability and attitudes. Like the Isenberg model, the MEES model is more descriptive than diagnostic. Furthermore, the model is subjective rather than objective, focusing solely on the local level (Liguori et al., 2019).

4.1.9 Internal Entrepreneurship Education Ecosystem

The model attempts to explain the concept of the ecosystem, which originated in the natural sciences but is increasingly being applied to regional development or clusters, which focus on solid inter-organizational relationships, building on the notion that the university is an essential player in the local entrepreneurship ecosystem. However, the study focuses on the internal entrepreneurship education ecosystem, interpreted as curriculum, co-curricular activities, and research. The study also highlights the infrastructure, stakeholders, resources, and culture that characterize internal entrepreneurship, leaving out other critical dimensions such as collaborations, networks, and local community (Brush, 2014).
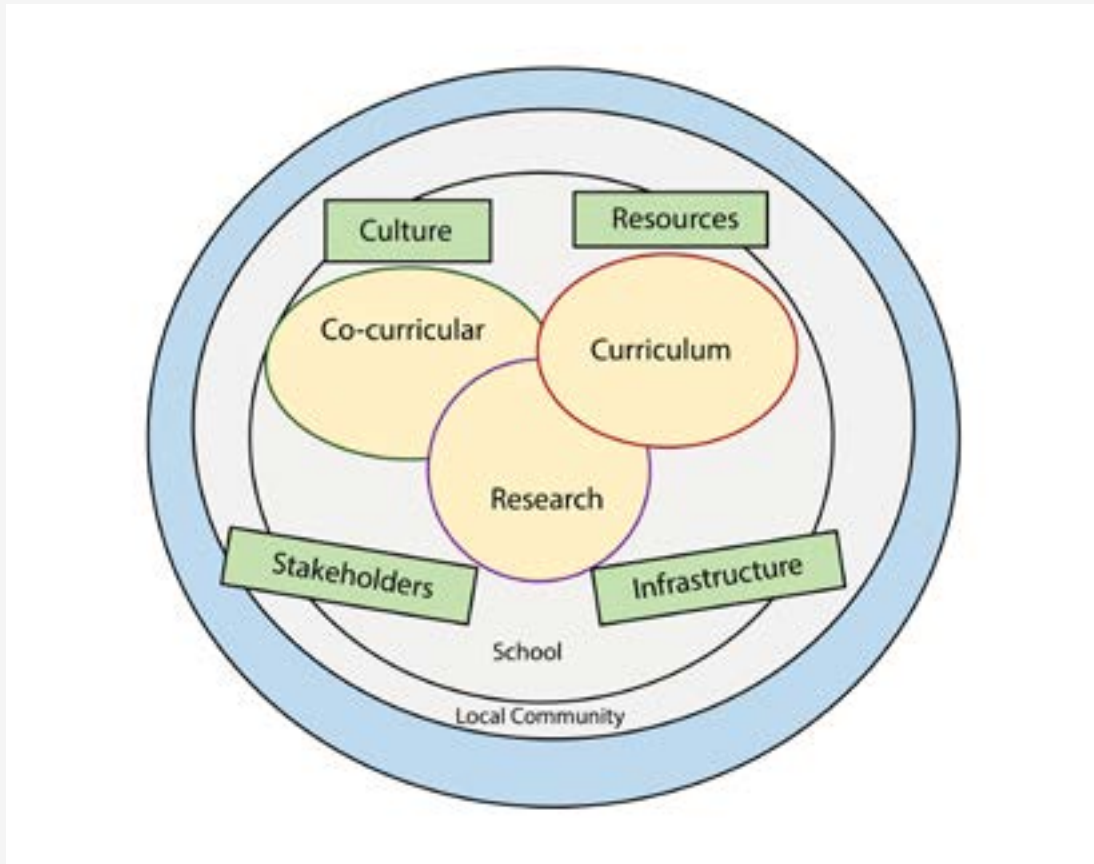
Figure 11. Internal Entrepreneurship Education Ecosystem.

4.2 ▸ Summary of the Reviewed Entrepreneurship Ecosystem Models

Table 2 summarizes the existing entrepreneurship ecosystem models from the literature review.

Table 2

Summary of Entrepreneurship Ecosystem Models

Model	Brief Description	Criticism
Isenberg's Model (2010)	Identified six domains within the entrepreneurial system: a conducive culture, enabling policies and leadership, availability of appropriate finance, quality human capital, venture-friendly markets for products and a range of institutional supports.	Applied to an industry-specific cluster, an evolving single industry or industries, geographically bound or to a specific geographical scale, such as campus, city, and region. The model is more of a descriptive model but takes it from a regional perspective.

Model	Brief Description	Criticism
World Economic Forum Model (WEF, 2013)	Applies six domains like Isenberg's on entrepreneurial ecosystems: policy, finance, culture, support, human capital, and markets. It focuses on education and training as pillars for consideration.	Examines institutions on different levels and how each institution plays a unique role. The WEF model puts more emphasis on a global perspective over institutions. It cannot be ideal for HEIs' conceptualization. Testing and validation are required for the identified pillars
Global Entrepreneurship Monitor (GEM report, 2019)	The GEM approach looks at individuals, assessing attitudes and perceptions towards entrepreneurship and self-reported involvement in starting and/or owning and managing a business. It also accounts for social, cultural, political, and economic context, which both influences and is influenced by this activity.	Provides entrepreneurship indicators primarily measured by self-employment and total early-stage activity at the national level.
Triple Helix Model (Farinha & Ferreira, 2012)	Understanding the interactions between three institutional spheres: university, industry, and government.	Not a suitable model to use in a region where universities lack adequate infrastructure and knowledge capacities, and thus, it may not be appropriate to consider within HEIs in Africa. Criticized for being theoretically vague (Razak and White, 2015). It is doubtful whether the model can be accepted as well-defined descriptive and analytic elements or simply as an evocative metaphor (Shinn, 1999).
Quadruple/ Quintuple Helix Models (Lindberg, Lindgren, & Packendorff, 2014)	In addition to the three institutions in the Triple Helix Model, it includes 'society and non-governmental institutions' in the ecosystem. The approach of the quintuple helix model is based on the concept of an advanced knowledge system.	Recognizes the importance of non-profit actors and areas in addition to public, private, and academic actors and areas.

Model	Brief Description	Criticism
Koltai's Entrepreneurship Ecosystem Model (2014)	The six pillars are Identify, Train, Connect & Sustain, Fund, Enable, and Celebrate. The six actors involved in the ecosystem activity are NGOs, foundations, academia, investors, government, and corporations.	The model looks at EE from the perspective of a hub and developing entrepreneurs rather than from the perspective of HEIs.
Khattab and Magli Entrepreneurship Ecosystem Model (Khattab & Al-Magli, 2017)	Influential players within the EE: education and training institutions, corporations and business associations, potential and existing entrepreneurs, government agencies/policymakers, financial institutions/investors, media organizations, technology community, business, and advisory agencies.	Although the model identifies a comprehensive list of important EEs, it recognizes that each player has cultural attributes that might influence its integration and its perception of entrepreneurs. The model cannot be adopted since it does not consider the perspective of institutions.
Multidimensional Entrepreneurial Ecosystem Scale (MEES) (Liguori et al., 2019)	Uses six domains by Isenberg on consideration of entrepreneurial ecosystems at the local level—policy, finance, culture, support, human capital, and markets—as well as two guiding principles, i.e., applicability and attitudes.	MEES taps into ecosystems as a subjectively rather than objectively assessed construct. The model is more descriptive than diagnostic. The use of Isenberg's six-domain taxonomy for considering the entrepreneurial ecosystem is limited as the emphasis was solely on the local level.
Internal Entrepreneurship Education Ecosystem (Brush, 2014)	It focuses on the internal entrepreneurship education ecosystem, interpreted as curriculum, co-curricular activities, and research. Additionally, it uses infrastructure, stakeholders, resources, and culture to characterize internal entrepreneurship.	The model leaves out other critical dimensions of EEs, such as collaboration networks and the local community.

Model	Brief Description	Criticism
Entrepreneurship Ecosystem Model (Mukesh and Pillai, 2020)	The proposed model considered three dimensions: program context, internal factors, and broader HEI ecosystems.	The model successfully redefined the critical elements of an HEI's EE, which incorporated the degree of entrepreneurial education in the curriculum, student orientation on entrepreneurship (SOE), entrepreneurial teaching methodologies, HEIs' ability to connect start-ups with industry (HACSI), mentoring and coaching programs for entrepreneurs (MCPE) and extracurricular activity relating to entrepreneurship (EARE). However, the model does not identify the outcomes of such an HEI EE. The model does not clearly outline the main activities that most HEIs have decolonized, namely interconnection in teaching, innovation, research, and community engagement. As a result, the model is only applicable to university-level teaching.

4.3 ▸ Insight from the Review of the Existing Entrepreneurship Ecosystem Models

Several EE frameworks have been used in the existing literature to explain the various factors and actors involved in developing thriving entrepreneurship ecosystems at the regional and institutional levels (see Table 2). Nonetheless, they all have flaws and deficiencies that make it difficult to use as a conceptual framework or model for this study. The primary weakness/deficiency identified within these existing models is that they do not address the specific issue of the internal EE of the HEIs in the context of SSA. For example, the Isenberg model addresses EE at the regional level through six domains that com prise the entrepreneurship ecosystem (Isenberg, 2011). Furthermore, the model has been chastised for being more descriptive than diagnostic of the entrepreneurial ecosystem (Mason & Brown, 2014).

In addition, the GEM model, for example, deals with country-level data on entrepreneurship competitiveness to emulate global competitiveness. This does not consider SSA-specific HEI issues. Similarly, an Integrated Model of Entrepreneurship Ecosystem used in previous studies does not consider HEI-specific issues or the SSA context.

Furthermore, the Triple Helix and Quadruple Helix Models address interdependence issues between academia, government, and industry through trilateral networks and hybrid organizations but not EEs in HEIs and SSA.

In conclusion, no existing EE model addresses the specific issues of EE in HEIs within the context of SSA. As a result, we have a significant gap in our understanding of EE that requires immediate attention.

4.4 ▸ Gaps From The Review

As noted from the insight (see Section 4.3), the EE literature lacks a model that captures the essence of EEs within HEIs in SSA. Given the unique characteristics of HEIs in SSA, along the lines of management, intellectual orientation, autonomy, few academic staff with doctorates, education quality, low levels of research output, most diverse ecosystems, challenged institutions, accountability issues, inadequate infrastructure development, and the general underdevelopment of such economies, it is crucial to develop a conceptual framework/model for the study of EE that takes these characteristics into account. Therefore, this project has proposed a new entrepreneurship ecosystem conceptual framework or model (see Figure 12) that will aid in exploring the link between EE and HEI within SSA to fill the existing gap.

5.0

Proposed Conceptual Framework/ Model

5.1 Discussion of the proposed Conceptual Framework/Model

Following the gaps identified **(see Table 2)** and the peculiarities of HEIs as discussed in **Section 3** (see EE Definition Document), this study proposed the following conceptual framework for EEs in HEIs in SSA **(see Figure 12)**.
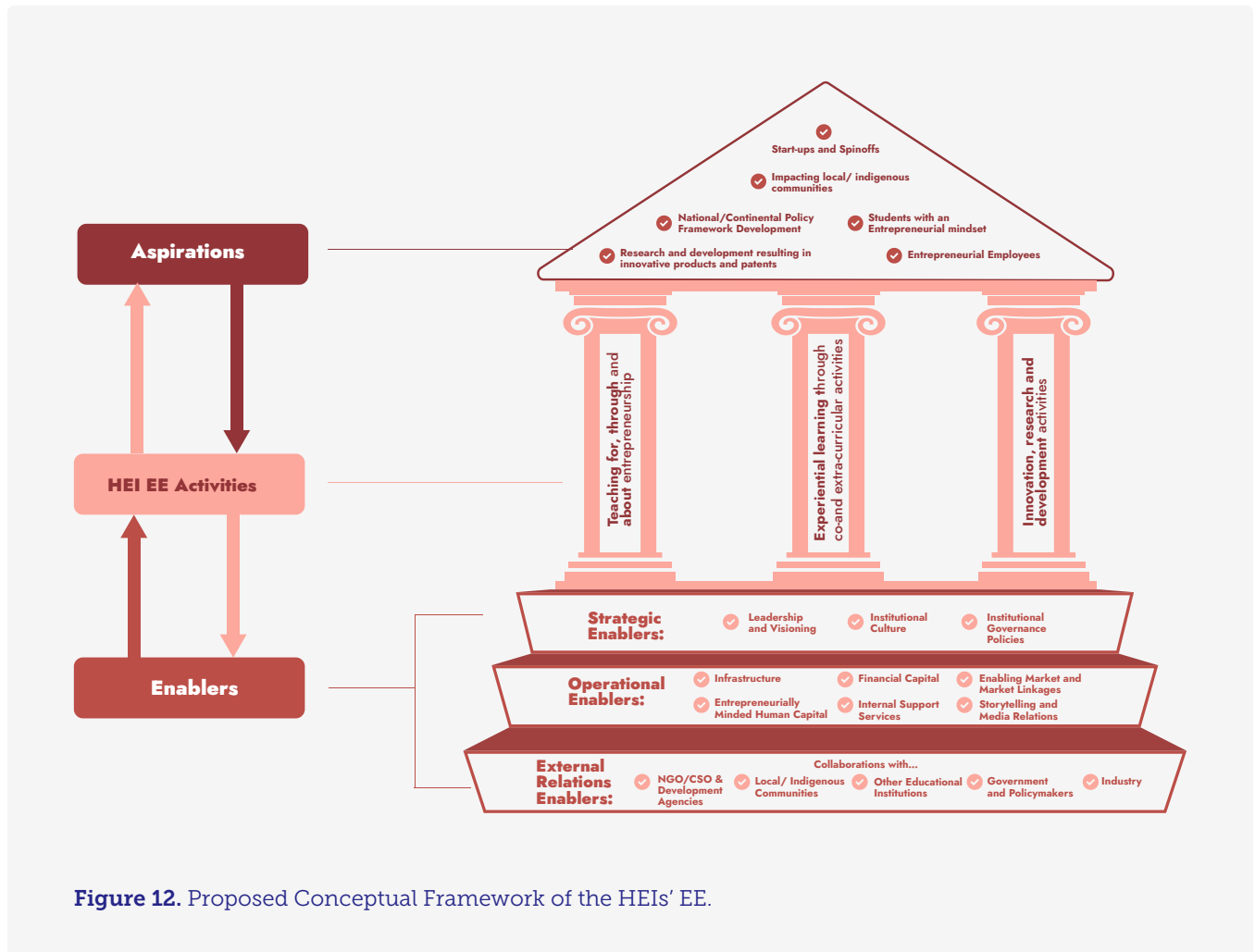
Figure 12. Proposed Conceptual Framework of the HEIs' EE.

This subsection discusses the proposed conceptual model. The model comprises three key elements as follows:

1. Entrepreneurship Ecosystem Enablers (EE enablers);
2. Higher Education Institution Activities (HEI activities);
3. Entrepreneurship Ecosystem Aspirations (EE aspirations).

A discussion of these three elements follows below.

5.1.1 Entrepreneurship Ecosystem Enablers

In the proposed conceptual framework, the enablers, which sit at the framework's base, refer to the resources, capital, or infrastructure contributed by internal and external stakeholders that the EE actors use in various activities. The enablers are classified into three categories: (1) strategic enablers, (2) operational enablers, and (3) external relations enablers (Koufteros et al., 2014).

Strategic enablers include resources such as institutional culture, leadership, and visioning. The operational enablers represent resources, assets, and capital from within the HEI, such as human capital, financial capital, internal support services, infrastructure, enabling market and market linkages, and storytelling and media relations. The external relations enablers include collaboration with the government, policymakers, industry, other educational institutions, local/ indigenous communities, NGO/CSO, and development agencies.

5.1.2 HEI Activities

Regarding the proposed conceptual framework/model, HEI activities that sit at the center of the framework include the core activities that define the development of an internal entrepreneurship education ecosystem as identified by the following authors (Brush, 2014; Alberti et al., 2004; Kuratko, 2005). The development of the internal entrepreneurship education ecosystem within the HEI domain consists of three key components as follows:

- (A) Core curriculum (entrepreneurship) curriculum;
- (B) Co- and extracurricular activities
- (C) Research, innovation, and development.

Core Curriculum Activities

According to Brush (2014), the curriculum is organized by discipline, program, or concentration for a degree. Notably, the entrepreneurship curricular activities are geared toward developing an entrepreneurial mindset and encompass teaching "about", "for", and "through" entrepreneurship (Ferrandiz et al., 2018; Sirelkhatim & Gangi, 2015). These activities are part of what is provided by the curriculum and are organized subjects through teacher guides. Usually, it is taught in class by teachers who specialize in each subject. The activities involve deciding which materials are used in courses, which cases, choice of exercises, pedagogies, concepts, and delivery mechanisms.

According to Sirelkhatim and Gangi (2015), there are three generic themes of entrepreneurship education provision:

- (a) Theoretically-oriented courses that teach 'about' entrepreneurship aim to increase awareness and encourage students to choose entrepreneurship as a potential career choice.

- (b) Practical-oriented courses that teach 'for' entrepreneurship aim to encourage students and enhance their intentions to be entrepreneurs in the future.

- (c) 'Through' entrepreneurship which aims to graduate entrepreneurs, support new venture creation, and develop entrepreneurial competencies.

Co- and Extracurricular activities

The co- and extracurricular activities include all non-degree bearing activities that enrich the students' (as well as staff, alumni, and communities') experience. The activities include but are not limited to programs, clubs, living experiences, workshops, guest speakers, forums, business plan competitions, networking, in-novation hubs, Launchpad, etc. According to Brush (2014), this includes decisions about co-curricular activities, the choice of leadership (faculty or staff), resources, audience served, and faculty incentives and resource allocation. Further, mentoring, start-up practices, entrepreneurial presentations, and access to co-working spaces are examples of co-curricular activities. The co- and extracurricular activities do not have to be directly related to the teacher's (curriculum) program but can be done with other ecosystem stakeholders (incubators and accelerators, governments, public institutions, and the business sectors) (Ferrandiz et al., 2018). Additionally, the micro-credentials such as skill, experience, and knowledge help enrich the co-andextra-curricular activities (DeakinCo, 2017).

Innovation, Research, and Development

This covers both theoretical and applied research across a broad domain, but primarily "the actors' actions, resources, environmental influences and outcomes associated with (a) the emergence of entrepreneurial opportunities and/or new economic activities in multiple organizational contexts, and (b) the characteristics, actions, and challenges of owner-managers and their businesses" (Brush, 2014).

They include decisions about research focus, faculty incentives and rewards, financial support, data access, and findings dissemination (Brush, 2014). The activities include design labs, maker spaces, research centers, tailored programs, etc.

5.1.3 Entrepreneurship Ecosystems Aspirations

Lastly, concerning the proposed conceptual framework/model, the entrepreneurial aspirations of the EE, which sits at the top of the proposed framework (see Figure 12), refer to an HEI's goals, motivation, and desires to develop the EEs that support the entrepreneurial intentions of the students, staff, alumni, communities, and other stakeholders.

The entrepreneurial aspirations of the HEI EE are identified as follows:

i Start-ups and Spinoffs

ii Entrepreneurial mindset

iii National/ Continental Policy Framework Development

iv Impacting local/ indigenous communities

v Research and development resulting in innovative products and patents.

vi Entrepreneurial Employees

In sum, the three components—EE enablers, HEI activities, and EE aspirations—come together to form the conceptual framework that addresses the concept of EEs within HEIs in SSA.

5.2 Using the Proposed Conceptual Framework to Address the Identified Gap

Two main gaps were identified relative to the existing EE models: the lack of an HEI context and the lack of a SSA context. This proposed conceptual framework (Figure 12) addresses the issue of the HEI context and the SSA context as follows:

First, the framework considers the peculiar nature of HEIs by acknowledging the specific role of their activities within the EE space. The proposed framework demonstrates this by specifically identifying the teaching, learning, and research activities, innovation and development activities, the co- and extracurricular activities, and the entrepreneurial curriculum content that uniquely describes the activities within HEIs.

Second, the framework considers the specific economic and geographical context within which the HEIs exist and operate. The framework demonstrates this by acknowledging the specific governmental policies, EE actors and industry, policymakers, the indigenous community, NGOs and developmental agencies, the financial markets, support services, and market linkages.

6.0

Validation of the Conceptual Framework

6.1 ▶ Theoretical Underpinning

The validation of the conceptual framework was premised and situated within the open system theory. According to proponents of open systems theory, institutions are influenced by what happens in their internal and external environments as they conduct their businesses (Roberts, 2019). Based on the theory, if HEIs are to maintain active EEs, they must adapt or create a strategic fit with their environment. The external environment consists of situations outside the HEIs' operating sphere and can be broadly classified as legal, economic, political, social, and technological forces. These elements are commonly referred to as the macroenvironment. Other elements of the external environment are situations influencing the HEIs' immediate operating sphere, also known as the microenvironment or industry forces. The microenvironment comprises the labor markets, customers, suppliers, creditors, and trade unions. Today, HEIs, like other organizations, face external environments that are highly dynamic and fraught with uncertainty. Organizations must, therefore, develop capabilities and core competencies to assist them in mitigating the adverse effects of their external environments while leveraging all available opportunities (Harrison & Leitch, 2010), as HEIs should.
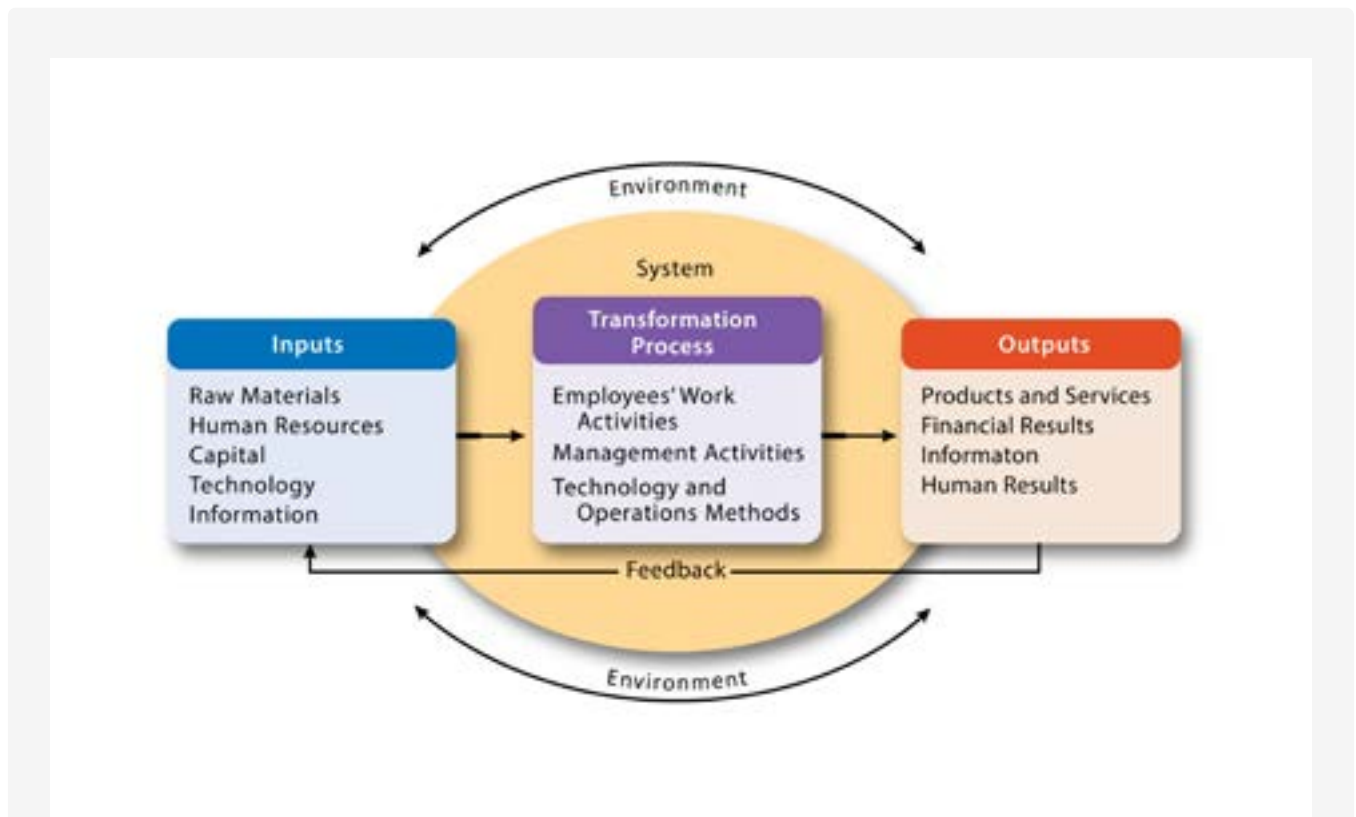
Figure 1. The Organization as an Open System Model.

Source: *https://slideplayer.com/slide/13066657/*

As such, this proposed conceptual framework was validated within the confines of the open system theory. Respondents in the focus group conversations—the primary data collection methodology—were asked to indicate their EE aspirations, what internal (HEI) activities they required, and what enablers they needed to achieve them. This corresponds to the inputs, transformations, and outputs, respectively, in the developed framework.

6.2.1 ▸ Validation Process Methodology

The study adopted the deductive reasoning approach to validate the conceptual framework, utilizing focus group discussions and thematic analysis.

6.2.1.1 Deductive Reasoning

Deductive reasoning, also called deductive logic or top-down reasoning, is a logical approach where the researcher progresses from general ideas to specific conclusions (Evans, 2013). It is often contrasted with inductive reasoning, where the researcher starts with specific observations and forms general conclusions (Hayes, Heit, & Swendsen, 2010). In deductive reasoning, the researcher often argues for a specific idea and draws inferences or conclusions, by applying different premises (Evans, 2013). A premise is a generally accepted idea, fact, or rule. It is a statement that lays the groundwork for a theory or a general idea (Oberauer et al., 2005). Conclusions are statements supported by premises. According to these authors, validity and soundness are two criteria for assessing deductive reasoning arguments. In this context, validity is about how the premises relate to each other and the conclusion. An argument is valid if the premises logically support and relate to the conclusion. However, the premises need not be true for an argument to be valid. An argument is sound only if it is valid and the premises are true. All invalid arguments are unsound. If you begin with true premises and a valid argument, you are bound to come to an accurate conclusion.

In line with the above discussions, the conceptual framework developed in Section 5, which is the premise, will go through the validation process using deductive reasoning to conclude whether its different components work together to define entrepreneurial ecosystems.

6.2.1.2 Focus Group Discussions

A focus group is a research method that brings together a small group of people to answer questions in a moderated setting (Nyumba et al., 2018). The group is based on predefined demographic traits, and the questions are designed to shed light on a topic of interest. Focus groups are primarily a confirmatory research technique (Moretti et al., 2010). Their discussion-heavy settings are thus most helpful in confirming or refuting pre-existing beliefs. They are great for conducting explanatory research, where a researcher is interested in exploring why a phenomenon occurs when limited information is available. As a rule of thumb, research topics related to thoughts, beliefs, and feelings work well in focus groups (Nyumba et al., 2018). If a researcher is seeking direction, explanation, or in-depth dialogue, a focus group could be a good fit.

Given the nature of this validation effort, which was purposed for in-depth exploration, and the applicability of the developed conceptual framework in the context of HEIs in SSA from a cross-section of stakeholders within the SSA HEI EE space, focus group discussions were employed as part of the exploratory methods.

6.2.1.3 Thematic Analysis

Thematic analysis is a method of analyzing qualitative data. It is usually applied to texts such as narratives and transcripts. The researcher closely examines the data to identify common themes—topics, ideas, and patterns of meaning that come up repeatedly (Braun & Clarke, 2012). There are various approaches to conducting thematic analysis. Still, the most common form follows a six-step process: familiarization, coding, generating themes, reviewing themes, defining and naming themes, and writing up. This process can also help researchers avoid confirmation bias when formulating their analysis (Clarke, Braun & Hayfield, 2015). Thematic analysis is an excellent approach to research where one is trying to explore respondents' views, opinions, knowledge, experiences, or values from a set of qualitative data.

For this validation process, thematic analysis aided the team in identifying the themes and the dimensions of the outcomes of the focus group discussions. Three focus group discussions were undertaken with various actors in HEIs across SSA. These will be discussed in the following sections.

6.2 Phase I: Preliminary Stakeholder Engagement

The team conducted two preliminary expert team engagements with two HEIs with active entrepreneurship ecosystems to validate the conceptual framework. The HEIs consisted of one small, young (below 30 years) private institution (INST1) and one of the largest and foremost public institutions (INTS2), both in Ghana. These sessions aimed to evaluate and validate the conceptual model's identified variables (inputs, transformation activities, and outputs).

The participants from the two institutions were expected to:

1 Brainstorm the inputs within their EEs, the transformation activities within their EEs, and the expected outputs (aspirations) for their EEs.

2 Reflect on how the HEI operationalized the identified inputs, activities, and outputs.

6.2.1 Institution 1 INST1 Expert Engagement

During the conceptual framework validation process, three focus group discussions (FGD) were held with actors from INST1. Participants included academics, administrators, EE actors, students, and alumni. The essence of the FGD was to allow participants to indicate components of typical entrepreneurial ecosystems in their institutions. Participants from the three groups indicated that, in their expert opinion, a typical EE within the context of HEIs comprises enablers (i.e., inputs), their activities (i.e., transformation mechanisms), and their goals/aspirations/expected outcomes (i.e., outputs), elaborated in the following subsections.

6.2.1.1 Inputs (Enablers)

About inputs—dubbed enablers—some of the participants in three FGDs for INST 1 alluded to human capital, financial capital, and collaboration with industry, among others (see Tables A1, A2, and A3 in the appendix) being enablers within their institution.

In this context, some participants indicated as follows:

There must be entrepreneurs at various stages of their entrepreneurial journey who can be recruited from the ecosystem (FGDRM1).

There must be industry practitioners, mentorship, coaching collaboration, and partnership (FGDRM2).

6.2.1.2 Transformation (Activities)

Concerning the transformation mechanism, which is the activities undertaken by the HEI, some of the participants from INST1 alluded to it comprising of core curricular-related activities, co- and extracurricular related activities, and innovation, research, and development (Refer to Table A1, A2 and A3 in the appendix).

In this context, some participants mentioned the following from **FGDRM1**, **FGDRM2**, and **FGDRM3**:

Funding, peer learning experiences, mentoring and coaching, ideation, prototyping, MVP research projects, incubation and acceleration, pitch competitions, bringing successful entrepreneurs to interact with students, and more entrepreneurship courses in specific domains.

6.2.1.3 Outputs (Goals/Aspirations)

About outputs, which are the same as the goals/aspirations, some participants in FGDs 1, 2, and 3 alluded to research and development, resulting in innovative products and patents, entrepreneurial employees, start-ups and spinoffs, and an entrepreneurial mindset, among others.

In this regard, some participants mentioned the following from *FGDRM1, FGDRM2, and FGDRM3:*

> *Number of live businesses, number of innovations, number of sponsored projects, number of research projects, number of concept papers, number of contact hours for mentoring/coaching, number of new businesses, number of trademarks and patents, impact – number of hybrid model businesses + community projects.*

6.2.2 Institution 2 INST2 Expert Engagement

Two focus group discussions (FGDs) with INST2 occurred during the conceptual framework validation. The participants comprised academics, administrators, EE actors and professionals. Given the heterogeneous nature of the participants, they were put into two separate meetings for brainstorming and reflection. The essence of the FGD was to allow the participants to indicate components of typical entrepreneurial ecosystems in higher education institutions. Participants from the two groups and the two meetings indicated that, in their expert opinion, a typical EE within the context of HEIs comprises inputs (i.e., enablers), transformation mechanisms (i.e., HEI activities), and outputs (i.e., goals and aspirations).

6.2.2.1 Inputs (Enablers)

Concerning inputs, which are the same as enablers, some participants in Group 1 alluded to human capital, financial capital, collaboration with industry, enabling markets, and market linkages, among others (see Table A4 and A5 in the appendix).

In this context, some of the participants indicated as follows:

> *Human capital, financial support, markets, technology, policy, personnel (HR)* **(FGDRM1, FGDRM2).**

6.2.2.2 Transformation (Activities)

Concerning the transformation mechanism, which are the activities undertaken by and within the HEI's EE, the participants in Group 1 alluded to core curricular-related activities, co- and extracurricular-related activities, and innovation, research, and development (refer to Tables A4 and A5 in the appendix).

In this context, some participants mentioned the following:

> *Business initiatives, student clubs, compulsory entrepreneurship courses, business projects, business plan competitions, training, consultancy for rural communities, intellectual property, innovation clubs, junior consultancy projects* **(FGDRM1, FGDRM2).**

6.2.2.3 Outputs (Goals/Aspirations)

Concerning outputs, which are the same as goals/aspirations, some participants in FGDs 1 and 2 alluded to research and development, resulting in innovative products and patents, entrepreneurial employees, start-ups and spinoffs, and an entrepreneurial mindset, among others.

In this regard, some of the participants alluded to the following:

> *Staff capacity enhanced to train others in entrepreneurship, technology available or provided to support new wave of teaching, DHub established and made operational, partnerships with industry (MoUs), support obtained from industry, students starting businesses, mindset changed, developing competencies* **(FGDRM1, FGDRM2).**

6.2.3 ▸ Synthesis of Preliminary Actor Engagement Findings

Interactions with various experts revealed three key concepts regarding their understanding of what should be included in an entrepreneurship ecosystem framework. These concepts included inputs (enablers), transformations (activities), and outputs (goals and aspirations). The findings of the expert engagement confirmed those of the desk review, demonstrating an entrepreneurship ecosystem framework. As discussed in the desk review, the engagement identified that enablers include issues such as policy, "Students," "Human Capital," "Financial Support," "Markets" and "Technology". Transformation focused on cases involving activities conducted within institutions, such as having an entrepreneurship curriculum and a set of entrepreneurship-based programs that drive the required transformation. Finally, the output (goal and aspiration) section addresses the expected outputs of an institution. These include a shift in mindset, business development, and students starting businesses.

Thus, these focus group conversations could lead to the conclusion that the open system theory does explain the fundamental structure of the entrepreneurship ecosystem of higher education institutions, at least the two engaged. It was further validated that the enablers, activities, and aspirations are a good way of capturing the open system elements within the context of HEIs in SSA. The team then scaled up this validation with a larger group of actors in a next-level validation exercise discussed in the second phase of the validation process.

6.3 ▸ FGD Phase II: Expert and HEI Practitioners FDGs

The second phase was planned and commissioned after the preliminary engagement with actors within the two institutions, as discussed in Validation Phase I above. This involved a mixed group of about forty-five participants who were attendees of the June 2022 Convening of The Education Collaborative at Ashesi. The participants were presented with a blank worksheet in four major groups: academic ecosystem actors, non-academic ecosystem actors, institutional leaders, and ecosystem actors external to the HEI. The worksheet presented the open system model,

and they were tasked with completing the inputs, transformations, and outputs of the entrepreneurship ecosystem of a typical HEI within SSA as they know it. After they did this, the proposed conceptual framework was presented to them for contextualisation and critique. Recommendations to enhance the framework were also made.

6.3.1 ▸ Participants Role Within The HEI EE

Participants in this phase of the validation process had myriad roles within the HEIs EE space. Their roles include leadership, lecturers, university support staff, and start-up owners. The full details of their roles are presented in Figure 14 below. Some stakeholders, specifically from the policy and investor space, were invited but could not join in the conversation. However, a significant group of leaders and actors worked through the activity to arrive at the components of the entrepreneurship ecosystem.

Figure 14. Participants' Role of Higher Education Institutions in Entrepreneurship Ecosystems.
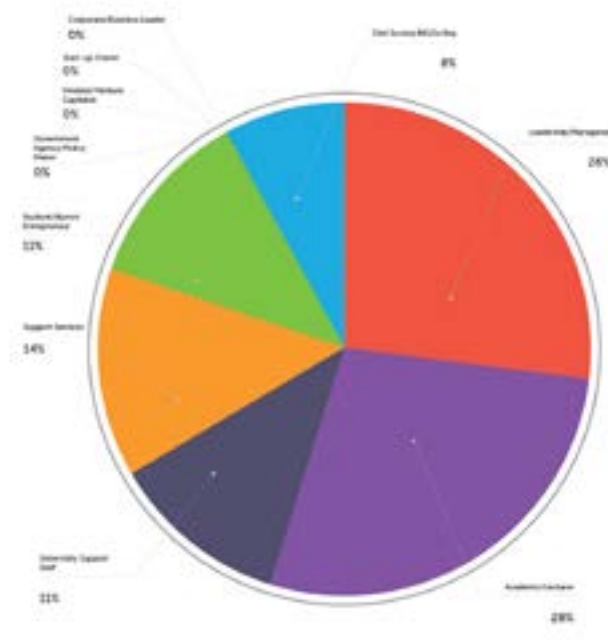
6.3.2 ▶ Findings From The Phase II Validation Engagement

Based on the expected outcomes of this focus group conversation, the participants were required to undertake two activities: identify the actors within the entrepreneurship ecosystem and map out the HEI's entrepreneurship ecosystem's open system based on the open system theory. Results were compiled from the four mini-groups that were formed: non-academic actors, academic actors, leaders, and external ecosystem actors. The following captured in Tables 3 to 10 present their findings.

Table 3

Actors Within The HEI's Entrepreneurship Ecosystem

Actors	Contributions of Actors	Expectations of Actors
1. Students	1. Training and mentorship	1. Solving industry problems
2. Faculty	2. Funding and resource support	2. Credible research output
3. Employers	3. Policy support	3. Grant support
4. Government players	4. Job creation	4. Trained and experienced support
5. University leaders	5. Networking	5. Developed entrepreneurial mindset.
6. Alumni	6. Technical expertise	6. Entrepreneur-friendly policies
7. Startups	7. Enabling environment	7. IGFs for HEIs
8. Industry mentors		8. Increased patents
9. Incubators		9. Intentional collaborations
10. Regulators		10. Market access

Table 4

Inputs: External and Internal Enablers of the HEI's Entrepreneurship Ecosystem

Enablers External to HEIs	Internal HEI Enablers	Both External and Internal Enablers
1. Policymakers/Government agencies 2. Private innovation hubs 3. Funding organizations 4. Enabling regulatory environment 5. Quality of human capital	1. University leaders/management 2. Training and development opportunities 3. Facilities 4. Entrepreneurial curriculum 5. Faculty 6. Internal incubators 7. Strong faculty development systems	

Table 5

Transformations: Activities Undertaken By The HEI's Entrepreneurship Ecosystem

About	Experiential (Co- and Extracurricular Activities)	Research and Innovation
1. Project-based pedagogy	1. Entrepreneurship Week 2. Hackathons 3. Boot camps 4. Business competitions 5. Pitches	1. Prototyping labs 2. Start-up loans

Table 6

Outputs: Aspirations of the HEI's Entrepreneurship Ecosystem

EE Aspirations to HEI	EE Aspirations Towards Stakeholders	Measurement of EE Aspirations
1. Entrepreneurship as career options 2. New businesses established. 3. Innovative ideas 4. Experienced entrepreneurship facilitators 5. Innovation	1. Accountability 2. Impact assessments 3. Openness and communication 4. Feedback and harmonization 5. Identify investment opportunities	1. Revenue 2. Spinoffs/outs 3. Patents 4. Startups 5. Scalable innovations 6. Research output 7. Quality of emerging businesses 8. Government engagement 9. Number of incubates existing after five years

As evidenced in the tables above, the consensus of these actors, in addition to identifying actors of the HEI's entrepreneurship ecosystem, their responsibilities, and their expectations, is the alignment of these ecosystems to the open systems theory. This further validates adopting the theory as the base theory for the framework. The groups thus aided in aligning inputs and enablers, transformations and activities, and outputs and aspirations. They further provided components that assisted in validating and updating the components of the conceptual framework. The framework was thus deemed adequately validated to be used by a select number of HEIs, also present at the June Convening of The Education Collaborative at Ashesi, to map out their entrepreneurship ecosystem.

6.4 ▸ FGD Phase III: HEI Entrepreneurship Ecosystem Actors

The primary objective of the third and final set of focus group discussions was to have the participants help in unpacking the entrepreneurship ecosystems of their HEIs. This FDG was organized to provide a platform to generate in-depth discussions on how stakeholders within the HEIs were operationalizing their entrepreneurship ecosystems. This helped gather data to validate the conceptual framework further and validate its ability to describe the entrepreneurship ecosystem of the HEI. This would later confirm its appropriateness as the base framework for the diagnostic tool. The session was facilitated by a team of four researchers who used open-ended questions to engage with the participants (see appendix).

Nine institutions were present and named as follows: INST3, INST4, INST5, INST6, INST7, INST8, INST9, INST10, and INST11. Once the participants settled down, they were put into four groups. Phase III FG1 had six members from INST3, Phase III FG2 had representatives from INST7, INST9, INST10, INST11, INST6, Phase III FG3 had representation from INST9, INST12, INST13, INST7, while Phase III FG4 had representation from INST4 represented by 7 participants. The following subsections discuss the outcome based on the objectives of the Phase III focus groups, which included:

❶ To discuss the operationalization of the elements of the EE of the institutions present.

❷ To validate the developed HEI EE conceptual framework.

6.4.1 ▸ Operationalization Of Elements of EE

The following subsections synthesized findings from the focus groups classified under enablers (inputs), activities (transformations), and aspirations (outputs). The insight gained facilitated the validation of the conceptual framework.

6.4.1.1 ▸ Enablers (Inputs) Of The HEIs

From a synthesis of the raw data collected, which is contained in Appendix B1 to B4, the following themes emerged as the enablers of their respective HEIs:

❶ External funding

❷ Internal HEI

❸ External donor community

❹ Collaboration with other HEIs

❺ International HEIs

❻ Leadership and visioning

❼ Infrastructure

❽ Internal governance policy

❾ IP ownership and requirements

❿ Enabling market

⓫ Industry network

⓬ Government policy and regulation

⓭ NGO/Community organization partnership

⓮ Culture

⓯ Quick wins

⓰ Industry linkages

⓱ Self-Sustaining

In support of the above, some of the respondents alluded to the following as some of the EE Enablers:

> "We have the National Service Program, and the government can place graduates anywhere. We have collaborated with the government to place graduates in Ashesi's National Service program, where they build their businesses and receive support from the institution to try them out. They also receive mentoring and funding."
> *(Resp 7 G1)*

Some other respondents indicated that:

*"That kind of environment is nurturing towards their businesses and heavily supported by institutional management, so there is funding that goes to support that." **(Resp 7 G1)**.*

In this same context, other respondents alluded as follows:

*"Well, one is that we have a lot of exchange programs. Recently, we hosted about 100 ESA Business School students just for their Doing Business in Africa program." **(Resp 4 G1)***

*"I will say for us the main enablers are institutional leadership." **(Resp 7 G1)**.*

While others added the following:

*"Leadership." **(Resp 4 G2)***

*"Leadership; we have a dedicated department that coordinates all these things." **(Resp 4 G2)***

*"In our institution, the best part of our motto is leadership. As you can see, I attended this conference with my provost...." **(Resp 4 G2)***

While others added the follows:

*"Some enablers include incubation centers, social media labs, and partnering with industry" **(Resp 1 G3)**.*

*"That's where the culture of an organization comes into completion" **(Res 3 G3)**.*

*"I recall that at the leadership level, there's a lot of design thinking happening." **(Resp 2 G3)**.*

*"There are some industry players who are utilizing students' ideas without paying. For example, there's a chain of supermarkets in our country that is very good at scouting innovators. It took a student who had innovated a payment system—a POS system—and made him a manager. The moment the company was done with his ideas, he was fired, but the idea remained. You know, patenting it, that was very bad." **(Resp 2 G3)***

*"The sustainable funding source is the third stream, including alumni funding, corporations, and businesses. So, the first and second streams balance the waters if we don't have third stream activities." **(Resp 6 G4)***

*"This is about how the university can generate funds to support more students. You are generating funds that support the university's work anyway, so it's not a deviation from what the institution does. It is just creating more support for other things that we do. It is self-sustaining." **(Resp 8 G4)***

6.4.1.2 Activities of the HEIs

The participants identified several themes under this component as follows:

1. Conducive environment
2. Build prototypes
3. Entrepreneurship classes
4. Grants for business
5. Incubators
6. Design thinking programs
7. International co-collaboration (students from Germany/Holland)
8. Real-world problems/Problem-based learning
9. Coaching/mentoring
10. Guest lecture sessions
11. Case studies
12. Extracurricular activities –prizes & swag
13. Research and innovation
14. Student engagement
15. Transformational teaching
16. SETA -The World Café
17. Transdisciplinary –engineering, health, education
18. Experiential learning
19. Structure internship
20. Capacity building
21. Curriculum
22. Idea testing
23. Instructional scaffolding
24. Industry partnership
25. Knowledge transfer

In support of the above themes, some of the respondents alluded to the following:

"The Enterprise Development Centre is under the fund. It organizes entrepreneurship classes and gives students seed money to start businesses on campus. They have classes, but the majority of the courses require starting a business. The center gives students money to run their businesses for a whole year. At the end of the year, they bring their accounts, return the money they received, and continue running their businesses." (Resp 3 G1)

"Well at least for us it is just Bachelor of Commerce Students. The entrepreneurial units are embedded within the curriculum. From first year to third year then from third you have an option of specializing in entrepreneurship. So, there is a specialization in entrepreneurship." (Resp 4 G1).

"Every group is given 50,000 naira to start up the business………. In your second year, you must do entrepreneurship. Second year and third year." (Resp 3 G1).

Other respondents asserted as follows:

For us we have got a lot to say. Because for our teaching, we have transformed the teaching to be student centred. We have developed tools that help lecturers to integrate soft skills in the classroom." (Resp 4 G2).

"So, these are generic tools, we call them SETAs. Student Engagement Techniques and Activities (SETAs). So, we train our staff on that. It is not just a tool you are given right. That's the other work, we are in training with the staff. Every time we introduce a new SETA, we train the staff how to use it." (Resp 4 G2).

"Today, we did a sample of a SETA for entrepreneurship called The World Café. We simulated a classroom situation and tested it with a SETA. We also engaged and asked, 'How can we use this in the engineering faculty, the faculty of health and education, or the faculty of business and accounting?' Once we train on that SETA—a generic teaching technique that can be used in any discipline—it helps you integrate a specific soft skill." **(Resp 4 G2)**

"Teaching entrepreneurship and teaching entrepreneurship and this is important. We identified this as a serious problem. There is teaching entrepreneurship where entrepreneurship is a subject. Where you teach it, you give students an exam, some pass and some fail. So that is teaching for entrepreneurship and then…. Oh sorry, that is teaching about entrepreneurship." **(Resp 4 G2).**

Some of the respondents alluded to the following as some of the HEIs activities:

"We do Student Engagement Techniques and Activities (SETAs) to keep students engaged. This is design thinking. Design thinking is all about having a problem and going through the whole process, step by step, to find a solution." **(Resp 3 G3)**

"Activities, you mentioned capacity building activities, collaboration with others and curriculum inclusion." **(Resp 1 G3).**

"The social media lab is where you subject most ideas to Facebook, to WhatsApp… you channel them through that. We have a social media lab that does that." **(Resp 4 G3)**

"My institution operates different ventures that bring in money to augment the income from the students. Hopefully, we will be more deliberate about that and try to see how to ensure our entrepreneurial programs are very effective." **(Resp 3 G4)**

"When we look at the process of entrepreneurship, it has to do with research. You don't wake up one morning and set up a business. Several things are involved." **(Resp 3 G4)**

"To share an experience, we encourage staff members to bring in guest lecturers, people from the industry, people from the business world." **(Resp 3 G4)**

6.4.1.3 Aspirations of the HEIs

The participants identified several themes under aspirations as follows:

1. Business startups
2. Spinoff
3. Entrepreneurial mindset
4. Local and international partnerships
5. Ethical and entrepreneurial leaders
6. Sustainability
7. Recognition - branding and positioning
8. Community engagement
9. Business continuity recognition/awards
10. Leader in entrepreneurship pedagogy
11. Student employability
12. Research and development - innovation
13. Patent, R&D
14. Agenda 63
15. Attitude, knowledge, competencies
16. Alignment with National Strategic Plans
17. National/Continental policy
18. Research, innovation, and development
19. Job creation
20. Entrepreneurial university
21. Smart KPIs
22. Behavior change
23. 23 Measurement

In this regard, some of the respondents alluded as follows:

"Well, one of our biggest aspirations is to, of course, have relevant partnerships and be big in partnerships...Kenya has quite a diverse ecosystem, so just trying to have the strategic partnerships." **(Resp 1 G1)**

"Our incubation center needs a lot of capital support, so we're looking to have strategic partners, investors, and a good pool of coaches, especially coaches in the entrepreneurial space who understand entrepreneurial pain points... such partnerships, considering entrepreneurship specifically." **(Resp 1 G1)**

"I know Ashesi as an institution wants to create a system....so first of all looking at our vision, educate a new generation of ethical and entrepreneurial leaders to change Africa." **(Resp 7 G1).**

".....for us we are looking at being a leader in entrepreneurship pedagogy. That is our aspiration. A leader in entrepreneurship pedagogy. Or simply a leader in the teaching of, the learning, we don't even say teaching and learning, the learning and teaching of entrepreneurship and innovation. To be the leader, I mean leading in terms of..." **(Resp 4 G2)**

"So basically, we think we are going to trailblaze in that area as well (R&D), we think we are going to be a leader there as well.... student employability" **(Resp 4 G2).**

Others asserted as follows:

"We think we are going to trailblaze in that area as well. We think we will also be a leader there because we have a tool for measuring behavior change. So, when you say that your employability is doing well, there will be some evidence, some data." *(Resp 3 G2)*

"Now, when you look at this, you align the vision of whichever country we are, and we are in four countries right now: Botswana—our headquarters—Lesotho, Namibia, and eastward Kenya. These countries have their respective visions, like Lesotho's Vision 2020. Botswana has Vision 2030. Similarly, eastward Kenya has Vision 2025, and Namibia has its own Vision 2025. These visions are aligned to the African Union vision." *(Resp 3 G3).*

"Our research focuses on measuring change in student behavior concerning some of these soft skills. It is very complex research because it is easy to measure success in hard skills." *(Resp 4 G2)*

In this regard, some of the respondents alluded as follows:

"Job creation" Response *(Resp 2 G3).*

"The university also has to transform in some way so students learn from what they see. You can't keep telling students about entrepreneurship, but they don't see you being entrepreneurial. The university itself is struggling to pay its debts." *(Resp 4 G4)*

"So I think the university should also transform into an entrepreneurial university where it is creating products, selling and making money, and involving staff and students in the process; otherwise, we are not practicing what we preach." *(Resp 4 G4)*

"Our vision and mission, stated through our quality policy, says we aim to produce employable, globally viable graduates with the right attitudes, skills, knowledge, and competencies for value creation toward sustainable economic growth for the nation and region." *(Resp 3 G3)*

"...create a solution, and the university fronts the selling. First, the university will use it...he spoke about an SIS that they developed. The university used it, and then he went out and sold the SIS on every platform. 10% went to the university, and 90% went to the developers." *(Resp 1 G4)*

"... He had a start-up. Now, that means he probably followed that process in year two. He didn't care about it, but the interest it was already sowed in him. He had been taught to recognize opportunity, so as soon as he saw one..." *(Resp 1 G4)*

6.5 HEI Executive Survey

The final level of validation was to seek university leaders' opinions in providing the team with feedback concerning the Aspirations list captured in the framework. A six-question survey was administered to 27 institutional executives at the June 2022 Convening of The Education Collaborative. The executives were handed questionnaires with the HEI aspiration and requested to indicate a "Yes", "No", or "Not sure" for each of the aspirations identified from the desk study and add on any others that must have been missed from the literature. Table 7 below captures their feedback.

Table 7

Aspiration Findings

Aspirations	Yes	No	Not Sure
Entrepreneurial venture creation, startups, and spinoffs	26	1	
Entrepreneurial and entrepreneurial graduates with a learning and innovative mindset	25	2	
HEIs influencing national/continental policy framework development	23	3	1
Venture products, services, innovations, and research output supporting the local and other indigenous communities	25	2	
Research and development that leads to innovation, new products, and patents	26	1	
Entrepreneurially minded staff	24	3	
Providing seed funding and access to venture capital	1		
Preparing entrepreneurial graduates for employment	1		

Thus, through this HEI Executive Survey, the study validated the entrepreneurship ecosystem aspirations of the institutions present.

6.6 ▸ Validation of Developed Conceptual Framework

The conceptual framework was validated by the understanding gained after synthesizing the field data from the multiple FGDs. A comparison was made between the themes of the developed conceptual framework and the themes from the FGDs under the dimensions of EE Enablers, HEI activities, and EE aspirations.

6.6.1 ▸ EE Enablers

The EE Enablers from the FGDs have been matched against those from the Developed Conceptual Framework (see Table 8).

Table 8

Matching the EE Enablers From The Study To The FGD Findings

EE Enablers Themes from the Developed Conceptual Framework	EE Enablers Themes from FGDs
Institutional culture	Culture; internal HEI;
Internal support services	
Infrastructure	Infrastructure
Human capital	IP ownership and requirements
Financial capital	External funding; Self-sustaining
Enabling market and market linkages	Enabling market
Leadership and Visioning	Leadership and visioning
Collaborations with NGO/CSO & development agencies	External donor community; NGO/ Community organization partnership
Collaborations with the local / indigenous communities	
Storytelling and media relations	Quick wins
Internal governance policies	Internal governance policy
Collaborations with government and policymakers	Government policy and regulation
Collaborations with industry	Industry network; industry linkages
Collaborations with other HEIs	Collaboration with other HEI; international HEIs

It can be deduced from Table 8 that the themes from the FGDs and the developed conceptual framework were similar and aligned for most of the factors identified from the FGDs. Thus, the results from the FGDs mimic that of the developed conceptual framework.

6.6.2 ▶ HEI Activities

The HEI activities that emerged from the FGDs have been matched against the HEI activities from the Developed Conceptual Framework (See Table 12).

Table 9

Comparison of HEI Activities

HEI Activities Themes From The Developed Conceptual Framework	HEI Activities Themes From The FGDs
Core-Curricular-Related Activities	Entrepreneurship classes; real-world problems/problem-based learning; guest lecture sessions; case studies; transformational teaching; transdisciplinary – engineering, health, education; curriculum; instructional scaffolding.
Co-Curricular-Related Activities	Build prototypes; grants for business; incubators; international co-collaboration –students from Germany/Holland; coaching; mentoring; extracurricular activities–prizes and swag; student engagement; SETA -The World Café; experiential learning; structure internship; capacity building; idea testing.
Co-Curricular-Related Activities	Design thinking programs; research and innovation; industry partnership; knowledge transfer; conducive environment.

It can be deduced from Table 9 that the themes from the FGDs and the developed conceptual framework were similar. Thus, the results from the FGDs mimic that of the developed conceptual framework.

6.6.3 ▶ EE Aspirations

The EE aspirations that emerged from the FGDs have been matched against the EE Enablers from the Developed Conceptual Framework (See Table 10)

Table 10

Comparison of EE Aspirations

EE Aspiration Themes From The Developed Conceptual Framework	EE Aspiration Themes From the FGDs
Start-ups and Spinoffs	Business startups; spinoff; business continuity recognition/awards; sustainability.
Entrepreneurial mindset	Entrepreneurial mindset; ethical and entrepreneurial leaders; student employability; job creation; behavior change.
National/ continental policy framework development	International partnerships; Agenda 63; alignment with national strategic plans; national/continental policy; entrepreneurial university.

EE Aspiration Themes From the Developed Conceptual Framework	EE Aspiration Themes From the FGDs
Impacting local/indigenous communities	Local partnerships; community engagement.
Research and development resulting in innovative products and patents	Research and development-innovation; patent, R&D; research, innovation and development; measurement.
Entrepreneurial employees	Leader in entrepreneurship pedagogy; attitude, knowledge, competencies; smart KPIs; recognition- branding and positioning.

From Table 10, the themes from the FGDs and the developed conceptual framework were generally the same. Thus, the results from the FGDs mimic that of the developed conceptual framework.

6.7 Section Summary

The findings from the FGDs generally align with the theoretical framework that has been developed. Institutional representatives could view their entrepreneurship ecosystems from an open system perspective, which served as a basis for their development. There is, however, the need to validate this quantitatively, which will be done as part of developing a diagnostic tool to aid HEIs within SSA in developing, describing, and diagnosing (D3) their entrepreneurship ecosystems.

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7.0

Appropriate Methodology to Study EEs in HEIS

7.1 Introduction

The study of the EE of HEIs within SSA requires an appropriate methodology to contextualize its outcomes. Methodology in this context refers to the research design, methods, approaches, and procedures used in EE studies. For example, data gathering, participants, instruments used, and data analysis are all parts of the broad field of methodology. In sum, the appropriate methodology articulates the logic and flow of the systematic processes followed in conducting an EE research project to gain knowledge about an EE problem.

7.2 The Appropriate Methodology

Diverse methodologies have been used in the extant literature to study EE. Some authors (e.g., Burton et al., 2006; Dillon & Stolk, 2012; Dillon & Olin, 2016) have used quantitative research methods to study EE, while others (e.g., Deci & Ryan, 2008) have used qualitative research methods to study the subject matter of EE. Given the complexity and nuances involved in the study of EE, this study proposed a mixed methods approach. Any EE study should adopt qualitative and quantitative methods to achieve the desired outcome and impact. Within EE studies of HEIs, quantitative and qualitative data will provide a better understanding of the research problem than either type alone. Additionally, more than one type of research (qualitative or quantitative) will be needed to address the research problem or answer the research questions. Furthermore, pragmatism—practicality, multiple viewpoints, biased and unbiased, subjective and objective nature of EE—requires the use of mixed methods to incorporate a qualitative component into an otherwise quantitative study and to build from one phase of a study to another, such as exploring qualitatively then develop an instrument to follow-up with a quantitative study. This will aid in obtaining more detailed information and validate the outcomes.

7.2.1 Mixed Method Approach

Mixed methods research combines quantitative and qualitative elements to answer a particular research question. Mixed methods can help researchers gain a more complete picture than a standalone quantitative or qualitative study, as it integrates the benefits of both methods. The mixed method utilizes both quantitative and qualitative data collection methodologies.

Examples:

- Interviews and questionnaires
- Performance tests and observation
- Questionnaires and follow-up focus groups
- Document analysis, performance tests, questionnaire, and interviews

Mixed methods research is often used in the behavioral, health, and social sciences, especially in multidisciplinary settings and complex situational or societal research (Creswell, 2013).

7.2.2 When To Use Mixed Methods Research

Mixed methods research is the right choice if the research process suggests that quantitative or qualitative data alone will not sufficiently answer the research question, as the desk study shows, which is always the case with EE studies.

There are several reasons for using mixed methods research:

- **Generalizability:** Qualitative research usually has a smaller sample size; thus, it is not generalizable. In mixed methods research, this comparative weakness is mitigated by the comparative strength of "large N," externally valid quantitative research.

- **Contextualization:** Mixing methods allows the researcher to put findings in context and add richer detail to the conclusions. Using qualitative data to illustrate quantitative findings can help "put meat on the bones" of the analysis.

- **Credibility:** Using different methods to collect data on the same subject can make the results more credible. If the qualitative and quantitative data converge, this strengthens the validity of the conclusions and assists in triangulation.

Note

- It should be recognized that mixed methods research does not just mean collecting both types of data; the researcher must carefully consider the relationship between the two and how the researcher will integrate them into coherent conclusions.

7.2.3 ▸ Mixed Methods Research Designs

There are different types of mixed methods research designs. The differences relate to the research aim, the data collection timing, and the importance of each data type.

As the researcher designs the mixed methods study, they also keep in mind the following:

◆   The research approach (inductive vs deductive);

◆   The research questions;

◆   What kind of data is already available for them to use; and

◆   What kind of data they can collect by themselves.

Here are a few of the most frequently used mixed methods designs.

◆   Convergent Parallel Design

◆   Embedded Design

◆   Explanatory Sequential Design

◆   Exploratory Sequential Design

7.2.3.1 ▸ Convergent Parallel

In a convergent parallel design, the researcher will collect quantitative and qualitative data simultaneously and analyze them separately. After both analyses are complete, compare the results to draw overall conclusions.
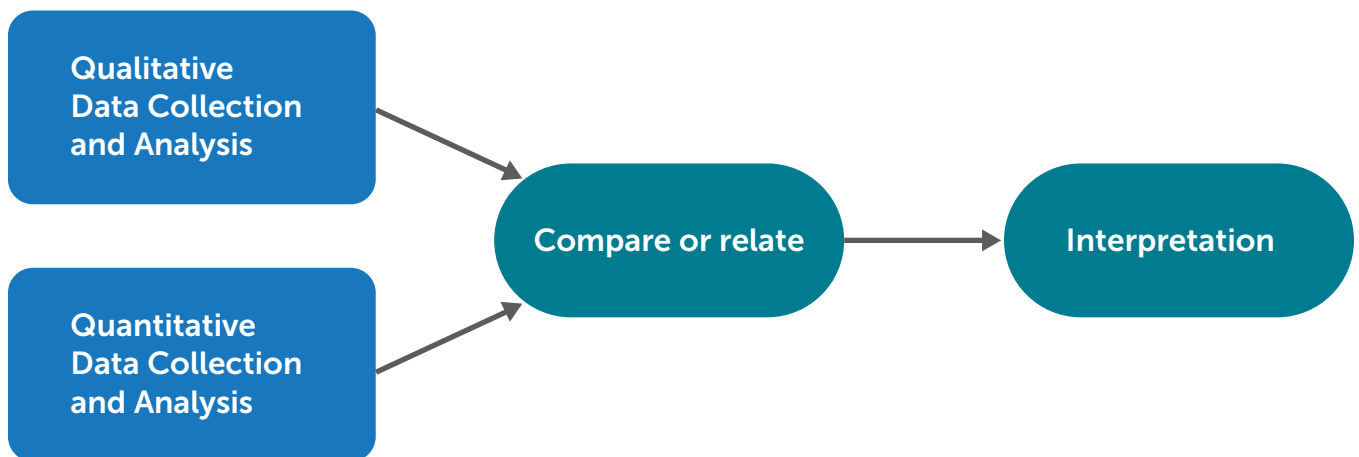
Figure 15. Convergent Parallel

Authors' Compilation, 2022

Convergent parallel design aims to obtain a more complete understanding from two databases, corroborate results from different methods, and compare multiple levels within a system. The philosophical assumption of the convergent parallel design is that it is best suited to an 'umbrella' paradigm such as pragmatism.

7.2.3.2 Embedded Design

In an embedded design, you collect and analyze both data types simultaneously but within a larger quantitative or qualitative design. One type of data is secondary to the other. This is an excellent approach if you have limited time or resources. You can use an embedded design to strengthen or supplement your conclusions from the primary type of research design.
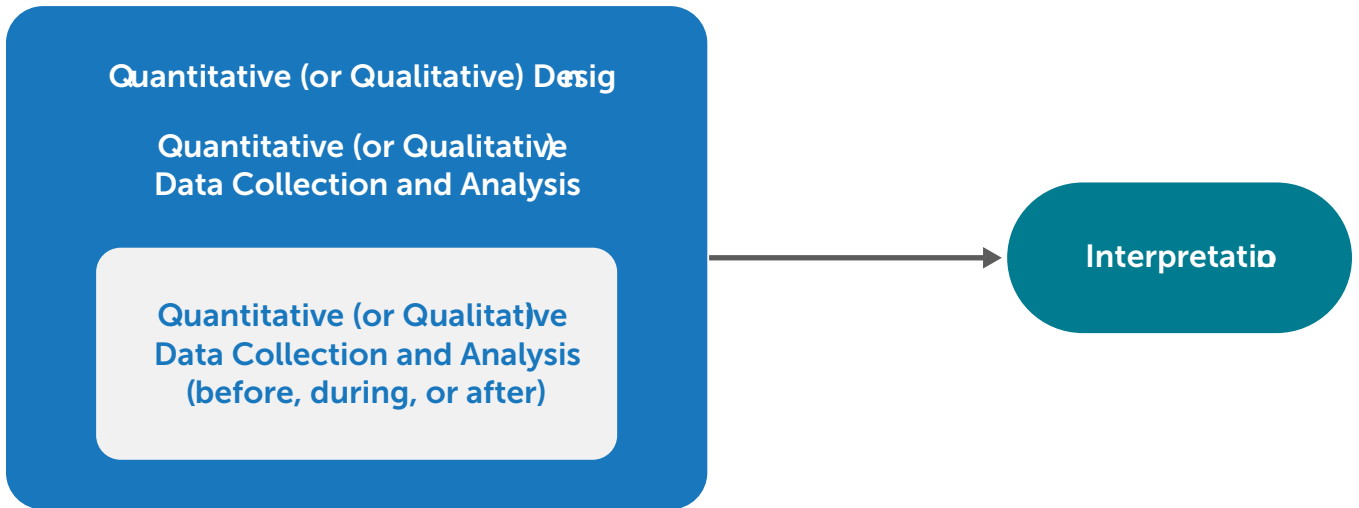
Figure 16. Embedded Design.

 Source: Authors' Compilation, 2022

The embedded design addresses questions that call for different methods to enhance an experiment, such as improving recruitment procedures, examining the intervention process, and explaining reactions to participation. The philosophical assumption of the embedded design is that worldview may reflect the primary approach, use pragmatism for a concurrent approach, or shift in a sequential approach.

7.2.3.3 The Explanatory Sequential Design

In an explanatory sequential design, quantitative data collection and analysis occurs first, followed by qualitative data collection and analysis. This design should be used if one thinks qualitative data will explain and contextualize quantitative findings.

The purpose of explanatory sequential design is to use qualitative data to help explain quantitative results that need further exploration. Additionally, it assists in using quantitative results to purposefully select the best participants for qualitative study.
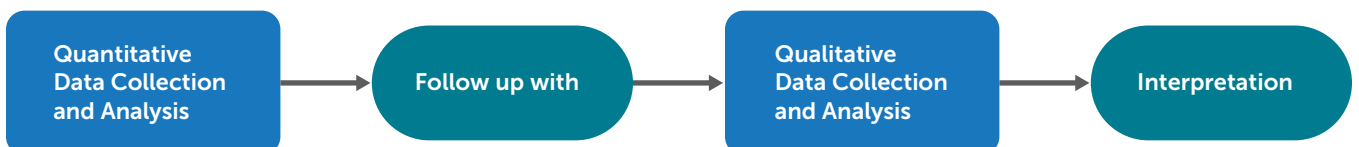
Figure 17 *The Explanatory Sequential Design*

 Source: Authors' Compilation, 2022

The philosophical assumption of the explanatory sequential design is that it begins from post-positivism for the quantitative phase and shifts to constructivism for the qualitative phase.

7.2.3.4 The Exploratory Sequential Design

In an exploratory sequential design, qualitative data collection and analysis occurs first, followed by quantitative data collection and analysis. This design can be used first to explore initial questions and develop hypotheses. Then, quantitative data can be used to test or confirm qualitative findings.

Qualitative Data Collection and Analysis → Follow up with → Quantitative Data Collection and Analysis → Interpretation
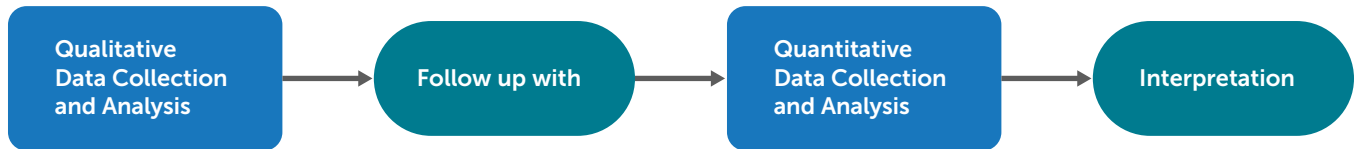
Figure 18. Exploratory Sequential Design.

Source: Authors' Compilation, 2022

The purpose of the exploratory sequential design is first to explore because variables, theories, and hypotheses are unknown, to develop an instrument or typology that is unavailable, and to assess whether qualitative themes generalize to a population.

The philosophical assumption of the exploratory sequential design is that it begins from constructivism for the qualitative phase and shifts to post-positivism for the quantitative phase.

7.2.4 Advantages Of Mixed Methods Research

Best-of-both-worlds analysis: Combining the two types of data means you benefit from the detailed, contextualized insights of qualitative data and the generalizable, externally valid insights of quantitative data. The strengths of one type of data often mitigate the weaknesses of the other. For example, solely quantitative studies often struggle to incorporate participants' lived experiences, so adding qualitative data deepens and enriches quantitative results. Solely qualitative studies are often not generalizable, only reflecting participants' experiences, so adding quantitative data can validate qualitative findings.

Method flexibility: Mixed methods are less tied to disciplines and established research paradigms. They offer more flexibility in designing research, allowing the researcher to combine aspects of different types of studies to distill the most informative results. Mixed methods research can also incorporate theory generation and hypothesis testing within a single study, which is unusual for standalone qualitative or quantitative studies.

7.2.5 Disadvantages Of Mixed Methods Research

Workload: Mixed methods research is very labor-intensive. Collecting, analyzing, and synthesizing two types of data into one research product takes a lot of time and effort and often involves interdisciplinary teams of researchers rather than individuals. For this reason, mixed methods research has the potential to cost much more than standalone studies.

Differing or conflicting results: If analysis yields inconsistent results, it can be very challenging to interpret them in a mixed methods study. If the quantitative and qualitative results do not agree or the researcher is concerned, they may have confounding variables, and it can be unclear how to proceed. Since quantitative and qualitative data take two vastly different forms, it can also be challenging to find ways to systematically compare the results, putting the data at risk for bias in the interpretation stage.

7.2.6 Steps For Conducting A Mixed Methods Study

There are seven general steps involved in conducting a mixed methods study. Figure 5 shows the various steps involved in the design:
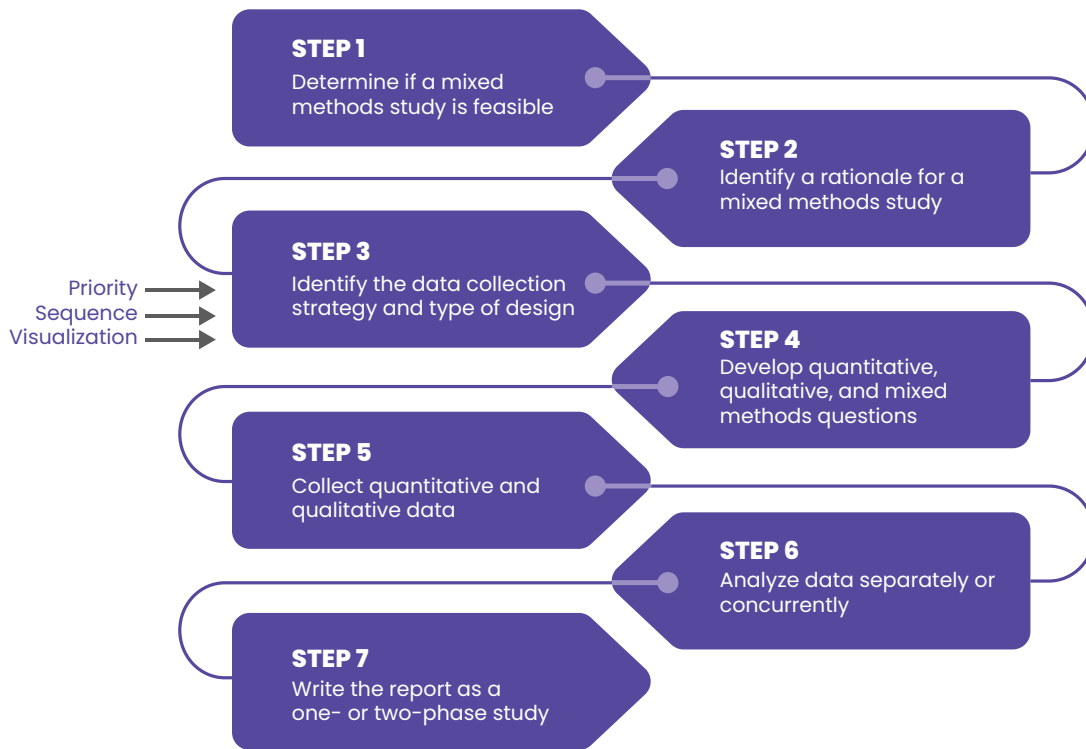
Figure 19. Steps in Mixed Method Study.
Source: Authors' Compilation, 2022
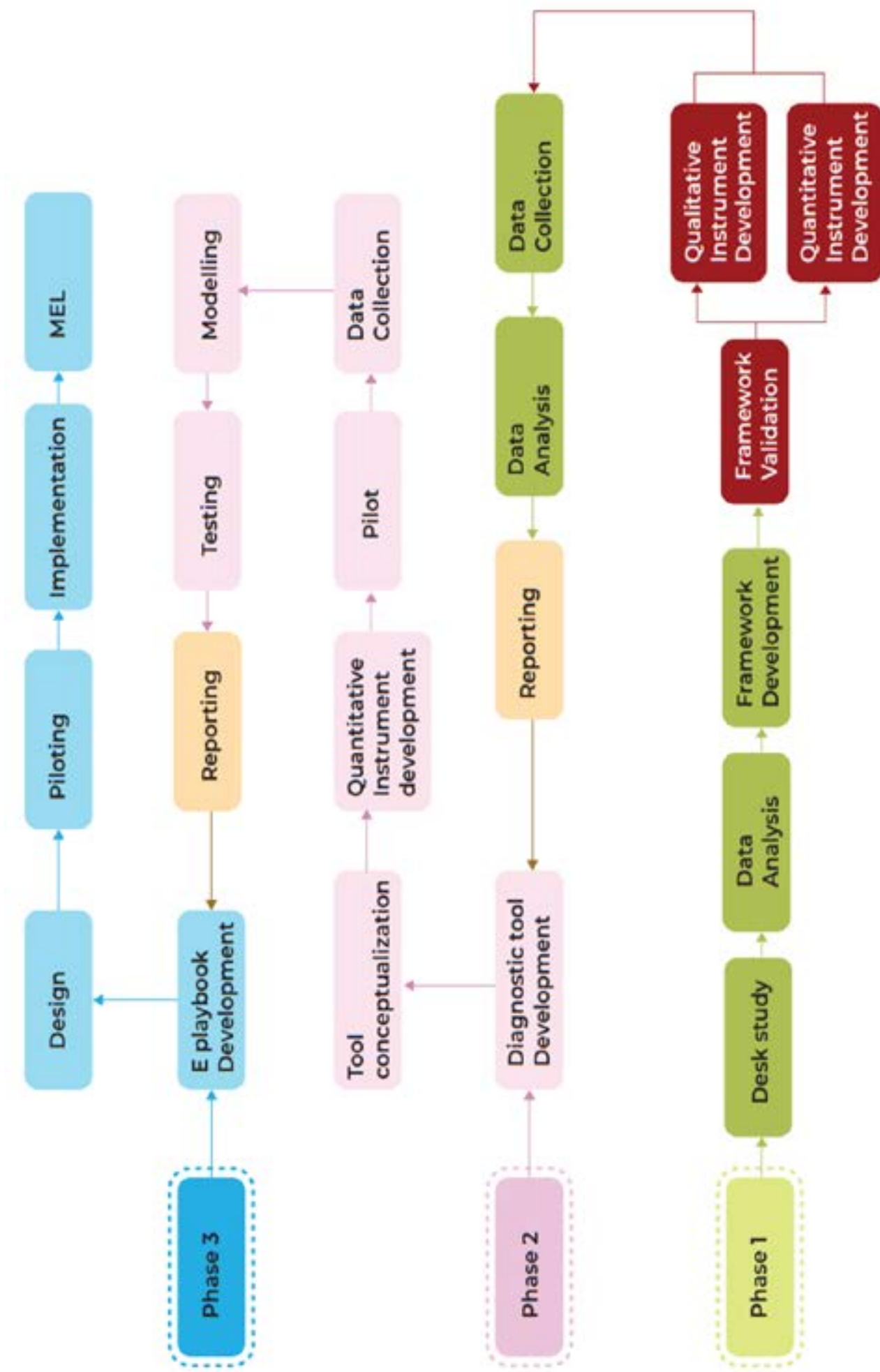
Figure 20. Guiding Logic Model (GLM).

The logic model (LM) is a graphical representation of operationalizing the appropriate methodology for studying EE in HEIs within SSA. There are three phases involved in the LM. Phase One (1) is the qualitative method, Phase Two (2) is the quantitative method, and Phase Three (3) is the deployment approach (See Figure 20). The overall LM reflects a mixed research method, the appropriate methodology for studying EE in HEIs within SSA.

Phase One employs qualitative research methods in which the researcher relies on the desk review (literature) and views of participants; asks broad, general questions; collects data consisting mainly of words (or text) from participants; describes and analyses these words for themes; and conducts the inquiry in a subjective, biased manner.

Phase Two employs quantitative research methods in which the researcher decides what to study, asks specific, narrow questions, collects quantifiable data from participants (a large number of participants), analyses these numbers using statistics, and conducts the inquiry in an unbiased, objective manner. In this context, Phase Two derives its motivation and input from Phase One.

Phase Three comprises the deployment stage of design, implementation, and monitoring. It should be emphasized that Phase Three relies on input from Phases One and Two.

The logic model shown in Figure 20 demonstrates sequential exploratory mixed research, which is expected to outline the various phases involved in executing EE projects in HEIs in SSA.

7.4 ▸ Theory of Change (ToC)

A theory of change is an in-depth rationale and set of examples for why and how a specific type of change is expected to occur in each setting. Specifically, it seeks to chart or 'fill in' the 'missing middle' between what a program or change initiative does (its activities or interventions) and how these lead to attaining desired outcomes. This is achieved by starting with the ultimate outcomes sought and working backward to determine what conditions must be met (and how they are related) for those outcomes to materialize. As such, for this EE project, which seeks to guide HEIs within SSA to realize their EE aspiration, a ToC is proposed. The details of this proposed ToC are presented below in the Outcomes Framework.

The Outcomes Framework is used as a guide to determine what actions or interventions need to be taken to bring about the outcomes that have been determined to be necessary for accomplishing the ultimate objective. This method helps clarify the connection between day-to-day actions and achieving overarching objectives. Better plans can be made by connecting actions to a more profound knowledge of the dynamics of transformation. As a result, evaluation improves, as it becomes possible to monitor development toward more far-reaching objectives than just identifying program outputs.

According to Wagner et al. (2019), the "theory of change assumes a linear causality between inputs, activities, (immediate) outputs, outcomes, and impacts."

Inputs	Activities	Outputs	Outcomes	Impacts
Resources dedicated to a particular program or initiative E.g. personnel, time, equipment, funding	The thing the program does with the inputs/resources Intervention used to bring the intended changes	Direct products of the activities Associated with the volume or level of the work that has been accomplished Often expressed in terms of units of service or the number of people served	Intended direct benefits/results of planned action Direct change in knowledge, attitude, values or behaviour Likely/achieved short-/medium-term effects of an intervention's output	Positive and negative, primary and secondary long-term effects Effects can be produced directly or indirectly Effects can be intended or unintended

Figure 21. Theory of Change Framework.

Having a ToC provides interventions with the following:

(i) A clear, testable hypothesis about how change will occur allows you to be accountable for results. It also makes your results more credible because they were predicted to occur in a certain way.

(ii) A visual representation of the change you want to see in your community and how you expect it to come about.

(iii) A blueprint for evaluation with measurable indicators of success identified.

(iv) An agreement among stakeholders about what defines success and what it takes to get there.

(iv) A powerful communication tool to capture the complexity of your initiative.

(v) As a framework to check milestones and stay on course

(vi) To document lessons learned about what really happens.

(vii) To keep the process of implementation and evaluation transparent so everyone knows what is happening

(viii) As a basis for reports to funders, policymakers, boards, etc.

Therefore, the theory of change can be fruitfully applied to analyze the effects of the entrepreneurship ecosystem (Murphy et al., 2020), which is the case for this project.

A TOC is based on defining all necessary and sufficient conditions for a particular long-term outcome. TOC utilizes backward mapping, which requires planners to retrace their steps from the long-term objective to the intermediate and then early-term changes needed to effect the desired change. As a result, a series of interconnected outcomes referred to as a 'change pathway' is produced. A 'change pathway' graphically depicts the change process as understood by initiative planners and serves as the framework upon which the other elements of the theory are constructed.

While developing the change pathway, participants must state as many assumptions as possible about the change process so that they can be examined and even tested to see if any crucial assumptions are challenging to support (or are even false). There are three different kinds of assumptions to consider: (a) claims about the relationships between long-term, intermediate, and early outcomes on the map; (b) evidence in favor of the assertion that all necessary conditions for success have been established; and (c) justifications for the associations between program activities and the expected results they will produce. According to the fourth type of assumption, the realization of outcomes along the change pathway will be supported or hampered by various contextual or environmental factors, frequently vital in illuminating the entire theory of change.

The objective of the TOC planning strategy is to ensure that outcomes are crystal clear at each phase of the change process. Users must provide several specifics regarding the change they wish to implement, including the population they want to affect, the amount of change required to demonstrate success, and the timeframe in which they anticipate the change. This attention to detail frequently aids funders and grantees in re-evaluating the feasibility of achieving initially unclear goals. In turn, this facilitates the development of reasonable long-term goals on which all parties can agree.

7.4.3 The Process of Arriving at a TOC from a Logic Model

A theory of change is a process and narrative that clarifies the desired outcomes and more significant impact that an organization, i.e., "changemakers," wants to see in the world and identifies how it intends to get there. A logic model aids in translating larger changes into action steps by clarifying strategy, tactics, and indicators. In other words, how will the 'getting there' take place? A standard logical framework is a chart or diagram that captures resources, activities, outputs, and outcomes, borrowing from the organization as an open systems theory. It can be a simple template that helps teams articulate what they think their programs involve and achieve. It will also set them up to test some of their assumptions and hypotheses (Murphy et al., 2020).

Figure 22 provides a typical guiding Theory of Change (ToC) derived from this study. It shows the current situation relative to EE and the various interventions that should be in place to arrive at the desired destination labeled in Figure

22 as impact. The Education Collaborative EE projects and project outputs sandwich the current state and the impact. The project output can link up with the outcomes for HEIs and their EEs, ultimately leading to impact. The Education Collaborative EE projects will feed into the HEIs' entrepreneurial activities. This can feed into external EE actors or feedforward into outcomes for the HEIs and their EEs, leading ultimately to the impact. The relationship between the external EE actors and the current state is recursive. Upon deployment of the e-playbook, this proposed guiding ToC will be validated.
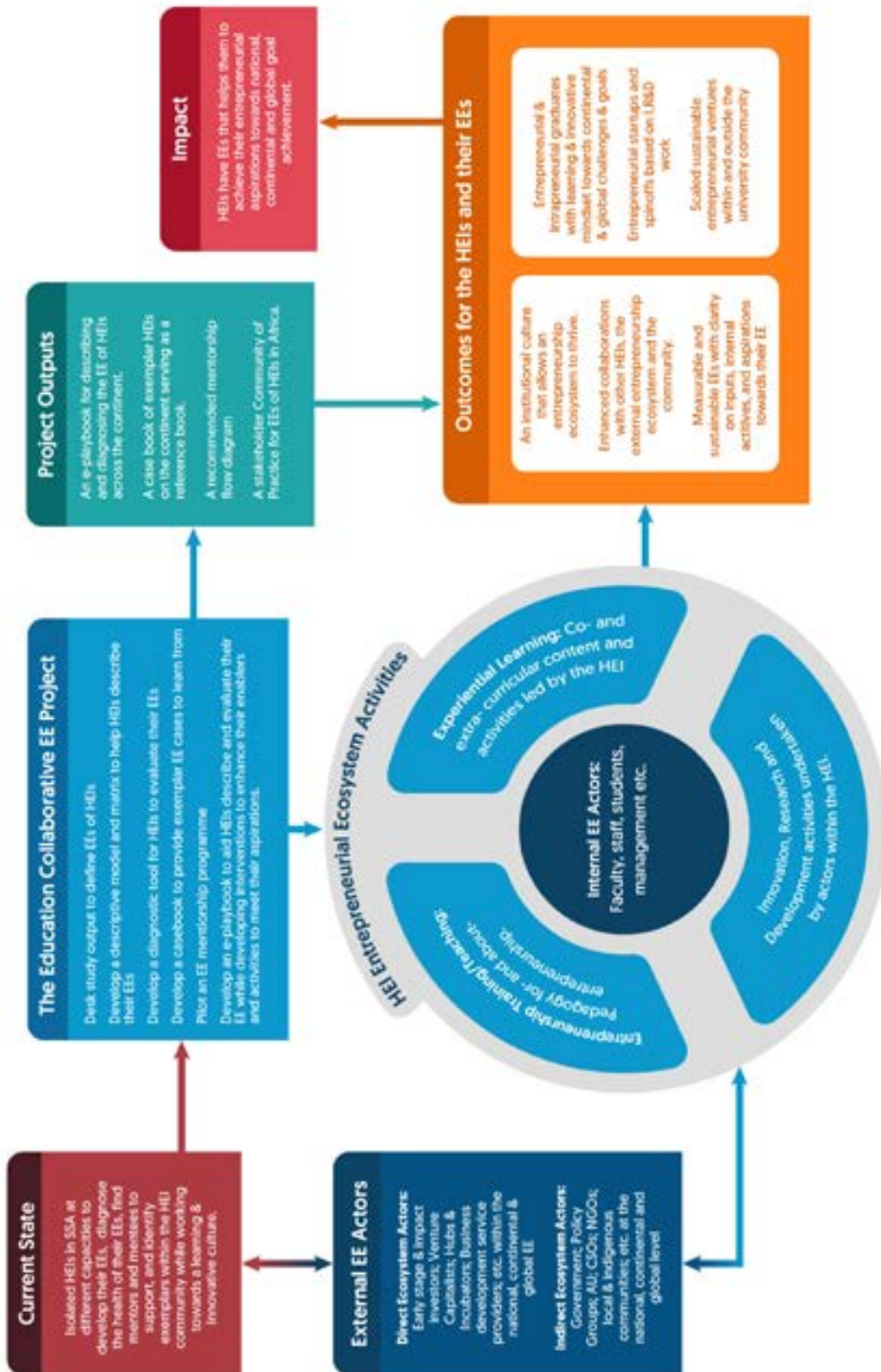
Figure 22. The Guiding Theory of Change.

7.5 ▸ Transition Process for HEIs to EE

Figure 23 depicts HEIs' transition from the current state to a new EE state. The process starts with the diagnosis of EE using the diagnostic tool. There are two decision points after this stage. The HEI will either achieve satisfaction with their current state of EE or fail to achieve satisfaction. If satisfaction is achieved, the HEI will maintain the current practice and conduct an annual review. This will qualify the HEI to obtain membership in The Education Collaborative Entrepreneurship Community of Practice.
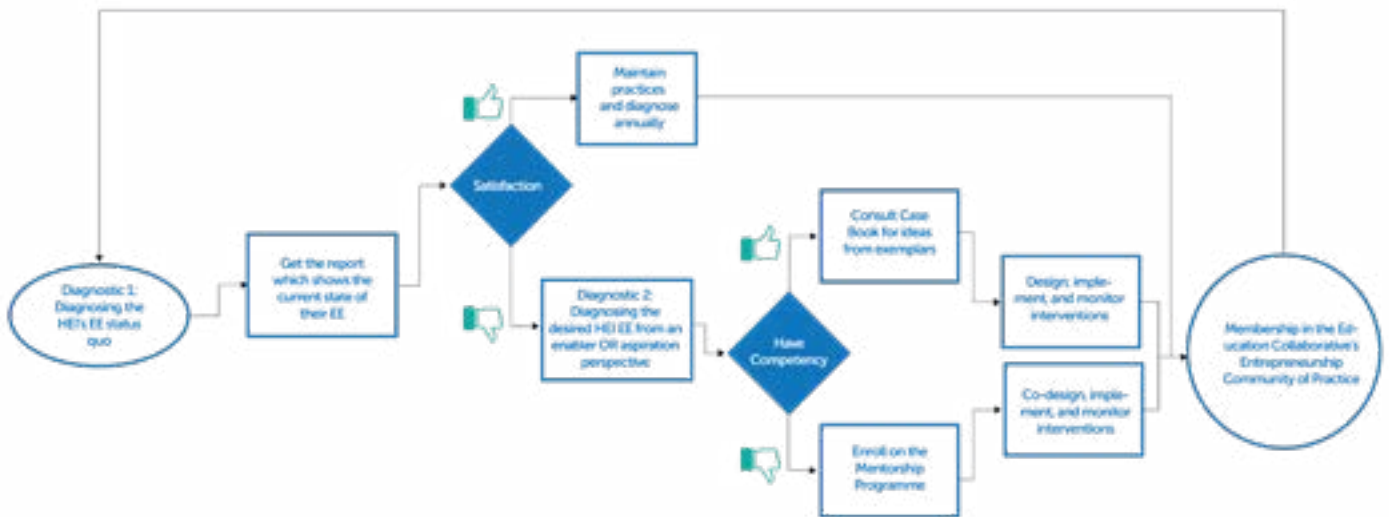
Figure 3. Transition Model for HEIs.

When a particular HEI fails to achieve satisfaction, it must prepare a report with suggested interventions and actions. After this stage, two decision points will again emerge based on whether competency is achieved. If they have the requisite competency, the HEI will consult a case book for ideas from exemplars. This will help the HEI to design, implement, and monitor interventions, after which stage the HEI can obtain membership in The Education Collaborative Entrepreneurship Community of Practice. Suppose they do not have the requisite competency. In that case, the HEI will enroll in the mentorship program to be supported in co-designing, implementing, and monitoring interventions. After that stage, the HEI can join The Education Collaborative Entrepreneurship Community of Practice.

7.5 ▸ Summary

This section outlines the process of developing the EE project logic model and theory of change. As described, a logic model is a visual representation of the programs that shows the relationships between resources, program outputs, actions, the desired short-term and long-term outcomes, and the impact to be generated. This section has outlined the various processes, activities, outputs, and outcomes expected with a statement on the impact the project will generate. The aim is to enable the reviewer to understand the programs developed, identify intended mechanisms, and measure the results. Further, the section also outlines the theory of change developed from the logic model. The ToC is underpinned by several relevant theories drawn from the EE literature to explain the expected relationships between the various levels of transformation from the current state in HEIs to the desired impact. The ToC also outlines how the project interventions developed (and presented in the LM) will be integrated to produce the EE project's expected short-term and long-term outcomes.

8.0

Conclusion

The Education Collaborative at Ashesi University commissioned this project with the intention of exploring the internal EEs of HEIs in SSA. This entailed creating a playbook to help them explore, understand, and measure their EE activities and aspirations, allowing them to develop interventions to help them achieve their aspirations. To achieve the broader aim, the study adopted a three-phase level approach. Phase One, the focus of this report, sought to define EE within SAA HEIs, propose a conceptual framework for EE within SSA HEIs, identify an appropriate methodology for the study of EEs within SSA HEIs, and develop a theory of change and transition process for SSA HEIs. The activities of Phase One yielded the following results: formal definitions of EEs in HEI of SSAs were established, a conceptual framework for EEs within HEI of SSAs was proposed, an appropriate methodology for the study of EEs was identified, and a theory of change with its associated transition process was also established. This study contributes to the larger EE literature by highlighting the role of EEs within SSA HEIs in their efforts to meet their HEI aspirations.

This study also informs policy by providing state actors and university councils with the necessary information required to formulate regulations and structures that should be implemented to ensure HEIs attain their EE aspirations. For practitioners within the EE, this study gives a detailed proposal on the nature and types of variables to consider when considering EEs within the HEIs of SSA.

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Categories	Findings	Operationalizations
Inputs (enablers)	'Entrepreneurs at various stages of their entrepreneurial journey' 'Human Resources - (Administrators, Project Management Teams)' 'Industry Practitioners - Mentors and Coaches' 'Willing and interested would be entrepreneurs' 'Faculty, Facilitators' 'Technology & Platforms' 'Funding' 'Incubation' 'Mentors' 'Provide an entrepreneurship Centers (physical space)'	'Recruit from the Eco-system' 'Recruitments and Onboarding Processes, Learning and Development Systems' 'Partnerships and Open Day Programmes eg. Career Fair Day, Business Competitions, FDE Fair, Hackathons etc.' 'Partnerships & Network Associations + Internship Programmes.' 'Student Body + Curriculum + Alumni' 'Utilisation of tech platforms- slack, MSOffice, CAMU, Canvas etc.' 'Master Card Foundation, MIT D-Lab' 'Climate Innovation Center + AVI + AXL + Community Ent Project'
Transformation (activities)	'Funding' 'Peer Learning Experiences' 'Mentoring and Coaching' 'Ideation, Prototyping and MVP ' 'Research Projects' 'Incubation + Acceleration' 'Pitch Competitions' 'Bringing Successful Entrepreneurs to Interact with the students' 'More Entrepreneurship Courses in specific domains. e.g. health, agriculture, etc' 'Run entrepreneurship venture for course credits (over semester or academic year)'	'Grants for student led projects and Institution led projects' 'AVI, Com Ent Project, AXL etc' 'Design Lab' 'Ashesi DLab, GCIC, Prof Adei' 'AVI + GCIC'
Outputs (goals/aspirations)	'number of live businesses' 'number of new innovations' 'number of sponsored projects' 'number of research projects' 'number of concept papers'	'AVI Incubatees and their new ventures' 'Kalangu' 'Contract'

	'number contact hours for mentoring / coaching'	
	'number of new businesses'	
	'number trademarks and patents'	
	'Impact (number of hybrid model businesses + community projects)'	
	'number of strategic partnerships' 'impact of alumni in key strategic roles'	
	'SDG Impact Projects'	
	'Funding will result in validated ideas (product/services)'	
	'Mentor will yield an enriched repository and enhanced access to real-life entrepreneurial stories for students to emulate'	
	'Wholesome Entrepreneurship Support System'	
	'Students will get to live the key tennets of entrepreneurship which is a good complement to the'	

Table A1. INST1 Group 1 Brainstorming and Reflection Output

Categories	Findings	Operationalizations
Input (enablers)	'Funding' 'Intellectual Contributions' 'Entrepreneurship Curriculum' 'Course Content and Learning Goals' 'Faculty, Mentors, Coaches' 'Fabrication Spaces' 'Intentionally behind the physical design of the institution'	
Transformation (activities)	'Expectation of quality of student delivery in entrepreneurial activities' 'The design of the entrepreneurship training across the curriculum' 'The development of the entrepreneurship centre' 'Funding to provide to students to test ideas safely' 'Exposure to external entrepreneurial leaders/ industry talks' 'Motivation from fellow students (student led programs'	'Intentional monitoring and evaluation of goals and improvements to the ecosystem' 'Faculty helps students to bring about ideas and coaches them to success' 'Students now view entrepreneurship as more than just an opportunity but a mindset towards their contributions in solving complex problems' 'Moves beyond theory and enables students to practicalize their ideas that have pressure tested throughout their university experience. They now have ready for market ideas'

Outputs (goals/aspirations)	'Industry coaches'	
	'Tested Businesses'	
	'Validated proof of concepts'	
	'Ideas that benefit local and regional communities'	
	'Stronger collaboration across sectors'	
	'Generation of profit to create sustainable long-term businesses'	
	'Stronger intellectual capacity in business'	
	'African case stories'	
	'Actualization of businesses beyond the institution, economic driver'	
	'Job creation'	
	'Increased self-confidence and expertise'	
	'Students taking ideas from class and building ventures'	

Table A2: INST1 Group/Room 2 Brainstorming and Reflection Output

Categories	Findings	Operationalizations
Input (enablers)	'Funding' 'Mentors' 'Provide an entrepreneurship Centres (physical space)' 'Introduce more practical entrepreneurship course content'	
Transformation (Activities)	'Pitch Competitions' 'Bringing Successful Entrepreneurs to Interact with the students' 'More Entrepreneurship Courses in specific domains. e.g. health, agriculture, etc' 'Run entrepreneurship venture for course credits (over semester or academic year)'	
Outputs (Goals/Aspirations)	'Funding will result in validated ideas (product/services)' 'Mentor will yield an enriched repository and enhanced access to real-life entrepreneurial stories for students to emulate' 'Wholesome Entrepreneurship Support System´ 'Students will get to live the key tenets of entrepreneurship which is a good complement to the'	

Table A3: INST1 Group/Room 3 Brainstorming and Reflection Output

Categories	Findings	Operationalizations
Inputs (Enablers)	'Students' 'Human Capital' 'Financial Support' 'Markets' 'Technology' 'Policy'	'L300 University-wide compulsory Entrepreneurship Course; L400 Business Student Initiative' 'Facilitators and lecturers; staff' 'BET Project; Africa's Biggest Idea Challenge; KIC Agritech Challenge' 'Exhibitions by Agric students' 'UCC WI-FI; Chemistry lab' 'L400 Agric Students project; UCC Business Incubator; DigiCap'

Table A4: INST2 Group/Room 1 Brainstorming and Reflection Output

Categories	Findings	Operationalizations
Input (Enablers)	'Personnel (HR)' 'Technology' 'Project funds/support' 'E-Learning platforms (E.g., Zoom, LMS (Moodle) etc.)' 'Time'	'Training for staff on entrepreneurship' 'Use of E-learning; Provision of speakers' 'DHub, Establishment of UCC Enterprises, Establishment of CESED, DRIC Innovation Policy (e.g. commercialization of research etc.), UCC Strategic Plan' 'Business plan competitions, trainings etc. Consultancy for rural communities (MSMEs), GP-PIE' 'Training on the use of the platform, procurement' 'Business initiatives (L400) ; Student clubs ; L300 compulsory entrepreneurship course.'
Transformation (Activities)	'Business initiatives (L400) ; Student clubs ; L300 compulsory entrepreneurship course, Agric Students (Semester Business projects)' Business plan competitions, trainings etc. Consultancy for rural communities (MSMEs), NEIP, ACECoR, Tech Transfer Office, Intellectual Property, Innovation Club, Junior Consultancy Project, DigiCap, BET Ghana projects, etc.	
Outputs (Goals and Aspirations)	'Staff capacity enhanced to train others in entrepreneurship' 'Technology available or provided to support new wave of teaching'	

'DHub established and made operational, Partnerships with Industry (MoUs), Support obtained from Industry'	
'Students starting businesses; Mindset changed; Developing Competencies'	

Table A5. INST2 Group/Room 2 Brainstorming and Reflection Output

Appendix BGroup 1 (Consisted of seven participants: six women and a man) INST3	Themes
"Well one of our biggest aspirations is to of course have relevant partnerships. Just to be big in partnerships. Especially with the diverse…. I mean Kenya has quite a diverse ecosystem. So just trying to have the strategic partnerships" Response (Resp) 1 G1	Aspirations
"I think we are more of…. like for instance our incubation centre needs a lot of support in terms of capital. So, looking to have strategic partners, investors, you know just to also have a good pool of coaches especially coaches who have been in the entrepreneurial space and understand the entrepreneurial pain points. Yeah, so such partnerships. If I look at entrepreneurship specifically." Resp 1 G1	Partnerships, both Local & International
"I know Ashesi as an institution wants to create a system….so first of all looking at our vision, educate a new generation of ethical and entrepreneurial leaders to change Africa." Resp 7 G1	Ethical and entrepreneurial leaders
"So, for us what we want to have is students with entrepreneurial mindsets" Resp 3 G1	Entrepreneurial Mindsets
"………. another perspective of sustainability as an institution" Resp 4 G1	Sustainability
"I think sustainability is one of the aspirations because if you don't have enough funding then of course you can have 5 pillars, strategic plans, have staff meetings but you have nothing to really operationalize some of those strategies." Resp 4 G1	Recognition- Branding and positioning
"I think an interesting point that this raises for me around the partnership to the whole idea of sustainability is that one can't rely on funding." Resp 2 Grp 1	
"…….. branding and positioning like you want to be known for something. Like specifically having that centre of excellence or uniqueness…………" Resp 4 G1	Community engagement
"So I know for Ashesi we really emphasize how we can begin to look at our community and look at problems and with critical thinking, innovative thinking, create solutions right that are able to problem solve, around those things right" Resp 7 G1	
"I'll be interested to know, have you done an impact assessment of where are the first cohort that you supported. Where are they now? Are they running their businesses or ditched that for employment." Resp 1 G1	Measurement of impact
"And every business mustn't make money, so some of the projects they've made losses but looking at what they wanted to do maybe cleaning business, they make so much money it won't be counted against them. What will be checked is the process and what the business was all about. So, it's not always about money. I know my students they want to make money, but everything is checked"	Money v. Process
"So, fourth year what will be checked is how many of those businesses are still running. Then give entrepreneurship award at the end of the 4th year." Resp 3 G1	Business Continuity Recognition/Awards
"There is grading. Second year is graded, third year is graded. And final	Grading

Appendix BGroup 1 (Consisted of seven participants: six women and a man) INST3	Themes
year are the recognitions." Resp 3 G1 "The one I know is from the last that graduated. He is still running his food business. As a matter of fact, when a museum had an event, they invited him to come. There is one that is doing a car business. And one baker, she is still doing it. It will be good to check on the first set." Resp 3 G1 "I did see a shoe cleaning business or something like that, this guy studying Computer Science, it's unlikely that he is going to continue running his shoe cleaning business once he moves to university. But he has learnt so much about how to approach entrepreneurship that I have no doubt that he will use these skills throughout his life. Even if he does become an employee somewhere, as an entrepreneur................. to create cobbler solutions to problems" Resp 2 G1	Business starts ups
"So, it means that we need to create the kind of environment that is conducive for them to think creatively and innovatively, and to be able to start to test out their ideas. And funding to support them to build prototypes to refine their business plans." Resp 7 G1 "So, the Enterprise Development Centre, it's for the fund. Organizes entrepreneurship classes and actually give students seed money to start a business in school. they have classes but majority of the courses you must start a business, they will give you money to run it for the whole year. At the end of the year, you bring your accounts, return the money they gave you and you continue running the business." Resp 3 G1 "Yes. So, let;s say an economics class and I have maybe 6 groups. Each group must come up with a business idea and they will be given money to run the business at the end of the year you write a report." Resp 3 G1 "And we have fairs, entrepreneurship fairs where they sell. We invite parents the community to come and buy from them. And interestingly at the end of the year there is an entrepreneurship award. If they can sustain....you know since it's graded second year and third year, if the student continues the business even to final year and looking at the books, he can run it, so he will get an award." Resp 3 G1 "Well at least for us it is just Bachelor of Commerce Students. The entrepreneurial units are embedded within the curriculum. From first year to third year then from third you have an option of specializing in entrepreneurship. So, there is a specialization in entrepreneurship." Resp 4 G1 "Every group is given 50,000 naira to start up the business.......... In your second year, you must do entrepreneurship. Second year and third year." Resp 3 G1 "BGP model that we have been discussing all throughout this week. And we do have some incubators, I actually, I just remembered out that but..... so please remind.....I am so serious, there is something that I'd like to tell you, I thought of it after your......and we have some design thinking programs that students are actually coming up with a problem that they've identified and they are working with some of the Sweden students in Germany and we actually have some exchange, some students yet to go to Germany and some Holland students come" Resp 6 G1 "And they work on each other's problems within the communities and the German's share their ideas. And at the same time, we are talking about the grading for it as well. But it is something that they implement. So, it's based on real-world problems." REsp 6 G1	HEI Activities Conducive Environment Build prototypes Entrepreneurship Classes Grants for business Incubators Design thinking programs International co-collaboration –students Germany/Holland Real world problems/Problem based learning Coaching, mentoring, Guest Lecture sessions

"And then we also have coaching, mentoring. We also have a lot of guest lecturer sessions." Resp 4 G1	Venture Incubator
". So, they have time and funds and support, mentoring, they have mentors, programs just to get them to refine prototypes, you know, all of that. So, by the end of the one year most of them have a viable business that they can run with. So, I think for me those are the....so it is a venture incubator." Resp 7 G1	
"Guest lecturer sessions where we invite industry players to actually come and give you know, practical ideas and thoughts around entrepreneurship, journey, more or less what we had in the session today just for people to see the practicality and also ask questions" Resp 4 G1	
"We have this guest lecturing and all of that." Resp 7 G1	
"And then we also have a lot of case study methodology, you know just have a proper case of an entrepreneurship journey of an entrepreneur and pick out points...yeah. Top of mind." Resp 4 G1	Case studies
"So, when students come in, in first year they have a program called Foundations of Design and Entrepreneurship." Resp 7 G1	Entrepreneurship course
"I think for us because it is the entry level, we tackle the mindset and the thinking around, you know, so design thinking and things around that which we really see the impact it makes during their four year stay in Ashesi right, so that's one of the major things that sets the foundation for students into entrepreneurship in Ashesi." Resp 7 G1	
One thing I thought about that I think was cool was I thought about extracurricular activities. Because that is the main way entrepreneurship leads to businesses. So as part of these extracurricular activities that we host, we do prizes and swags and stuff like that because how do you keep students interested in an extracurricular activity especially when .... in first year" Resp 2G1	Extracurricular activities – Prizes & swags
	Research and Innovation
"And then I think within our university what really helps us is where........ they are exclusively there for the purpose of research. There are also incubation services and the university is not fully converged in businesses that if wasn't sustainable, it's also based on other students..." Resp 2 G1	Incubation
"So that kind of environment that is nurturing towards their business and is heavily supported by institutional management so there is funding that goes to support that. Resp 7 G1	Funding/Funders
	Internal (HEI)
"Then we have a donor community, so when we approach a donor community one of the things that we actively seek funding for is to cover like entrepreneurship, like Mastercard foundation supports a lot of our entrepreneurship ecosystem at Ashesi right." Resp 7 G1	External (Donor community)
"You all know far better than I do how it is to scramble for places to apply to get strategic funding things like that so looking outwards for the funding and I mean what comes with that as was pointed out is the access to knowledgeable mentors that is built into that type of partnership. So...very interesting" Resp 2 G1	
"You know we have the National Service Program right and the government can place you somewhere. So, what we have done is collaborated with the government so we have students that we can place on Ashesi's National Service but for their National Service they are building their business and they are getting support from the institution to try it out and they get mentoring, and they get funding and they get you know" Resp 7 G1	Collaboration
	Network
"Well one is that we have a lot of exchange programs, like recently we hosted about 100 ESA Business School students just for their Doing Business in Africa program, so they have a lot of exchange. Resp 4 G1	Collaboration with other HEI
	International HEIs

"I will say for us the main enablers are institutional leadership right" Resp 7 G1	Leadership and Visioning
"It is something that the institution has prioritized so whether it is looking for funding in setting up systems, promoting those systems. They are... you get their hundred percent backing because we also want to be known for entrepreneurship as a pillar of entrepreneurship on the continent." Resp 7 G1	

Table B1. Fireside Group 1 (G1) Focus Group Discussions

Fireside Group 2: Focus on INST9 (Consisted of seven participants: three women and four men)	Themes
"......for us we are looking at being a leader in entrepreneurship pedagogy. That is our aspiration. A leader in entrepreneurship pedagogy. Or simply a leader in the teaching of, the learning, we don't even say teaching and learning, the learning and teaching of entrepreneurship and innovation. To be the leader, I mean leading in terms of..." Response (Resp) 4 G2 "So basically, we think we are going to trailblaze in that area as well (R&D), we think we are going to be a leader there as well.... (student employability)" Resp 4 G2 "One, we want to optimize the employability of our students. And we also want to share best practices. So, it's not just to our students but whatever is working.... we also want to, just like Ashesi is sharing." Resp 3 G2 "R&D is the next, research and development that leads to innovation of new products." Resp 2 G2 "But he has applied for patent because what he feels is that it's something innovative, something Tesla has not done or any of those people who are doing electric cars." Resp 4 G2 "In Botswana right now IP is a big thing. IP is a very big thing. But if you, that's why he is asking about data. Right now, in Botswana, the custom is even if someone puts name in a form....what are you going to do that for? Because people have become very aware of how companies are misusing data." Resp 4 G2 "Yes. Now, there is something about also IP which he mentioned that... You see for you to commercialize innovation you need IP. .... So, this is a drawback because then you cannot commercialize student innovation. You can't commercialize" "No, the policy is not written but somehow it is in an MOU." Resp 2 G2	HEI Aspirations Leader in entrepreneurship Pedagogy Role model Student Employability Research and Development –Innovation Patent , R&D Intellectual Property IP/ Commercialisation/ Innovation
"So basically, we think we are going to trailblaze in that area as well, we think we are going to be a leader there as well, because we have a tool for measuring behaviour change, okay. So, when you say that your employability is doing well there will be some evidence some data" Resp 3 G2 "Our research is focusing on measuring change in student behaviour with respect to some of these soft skills. It is very complex research because it is easy to measure success in hard skills." Resp 4 G2	Measurement Behaviour change
"For us we have got a lot to say. Because for our teaching, we have transformed the teaching to be student centred. We have developed tools that help lecturers to integrate soft skills in the classroom." Resp 4 G2 "So, these are generic tools, we call them SETAs. Student Engagement Techniques and Activities (SETAs). So, we train our staff on that. It is not just a tool you are given right. That's the other work, we are in training with the staff. Every time we introduce a new SETA, we train the staff	HEI Activities Student engagement Transformational Teaching Student Centred

how to use it." Resp 4 G2	SETA -The world Café
"Today we did a sample of a SETA for entrepreneurship called The World Café. So, we simulate a classroom situation and test it with a SETA, and we also engage, I mean how can we use this in the faculty of engineering? Faculty of health and education. Faculty of business and accounting. So, once we train on that SETA which is basically a generic teaching technique which can be used in any discipline, but it helps you to integrate a specific soft skill." Resp 4 G2	Teaching technique Transdisciplinary –Engineering, health, education
"Yes, I know there is teaching for entrepreneurship and then teaching...." Resp 4 G2	Teaching for Entrepreneurship
"Teaching entrepreneurship and teaching entrepreneurship and this is important. We identified this as a serious problem. There is teaching entrepreneurship where entrepreneurship is a subject. Where you teach it, you give students an exam, some pass and some fail. So that is teaching for entrepreneurship and then.....Oh sorry, that is teaching about entrepreneurship." Resp 4 G2	Teaching about Entrepreneurship
"Our focus in teaching for entrepreneurship is mindset change. Mindset change. So, we want our students to have an entrepreneurial mindset. And that is what we try to promote using those, what we call SETAs." Resp 43 G2	Mindset change
"Internship, you know all of that. Everybody does that. Internships all of that." Resp 4 G2	Entrepreneurial mindset
"So, our internship is structured. It is so well structured...... We even got template for everything. Template for everything, so I think just make sure you have a structured internship. Structured internship. It is not a vague thing where students just go around town." Resp 3 G2	Experiential learning
"a multi-pronged approach. So, we are not just using one thing, we are using this and that and all together you know. The vision is one. For example, experiential learning teaching for entrepreneurship, teaching about entrepreneurship, we do all of that, okay. Of course, with varied intensity" Resp 4 G2	Structure Internship
"Yes, for us we do just basic research as well as research that focuses on producing products. This year, we've got... with our students and one staff member they have developed an electric vehicle. Yeah, and it's working."	Research and Innovation
"Leadership" Resp 4 G2	Leadership
"Leadership, we have a dedicated department that coordinates all these things." Resp 4 G2	
"In our institution the best thing of what our motto is, leadership. You can see I was in this conference with my Provost...." Resp 4 G2	
"And then we also fund it. Like our EV is hundred percent funded by us. Our electric vehicle is funded by us. We didn't get any money from anybody. So, the university has a budget for these things." Resp 4 G2	Funding
"You see Botswana is a small country and getting funding locally for research is not the easiest thing. You know, most of the companies in Botswana, have their mother company in either South Africa or Europe" Resp 4 G2	External funding (capital)
"in especially in research, you go to the company, you approach them they tell you, but our R&D which is Research and Development. Our R&D is based in Germany, or it's based in Europe. So even a small thing like this, you check the bottom made in China or whatever. That's where the R&D is. So, for them they bring finished products. There is no research in this. For us we want to do retailing, how can we sell? Not to come and talk of what to make." Resp 4 G2	For R&D
"And some of our professors have got very good funding. Last year one got almost 1,000,000 pula. A million pula in Kenyan shillings is what? 10,000,000. That's good money. A million pula in dollars is like 100,000	Research funding/Fundraising

dollars" Resp 4 G2 "Yes, proposal writing. Fund proposal writing specifically yeah." Resp 4 G2 "Yes, they are ranked as maybe upper-middle income. So, when somebody wants to fund a country in Africa, he looks for either lower-middle- or lower-income countries. So, for us when they see upper-middle, oh these guys are fine." Resp 4 G2	Socio-economic status
"Top class, top class. Just like the office. When you come to our university, our facilities are just like that. Small and very beautiful." Resp 4 G2 "Maybe well maintained, not necessarily new but we have another new campus. Way new and very nice. The one we are on is the first one that is very very well maintained." Resp 4 G2	Infrastructure
"Internally, we've got our policies but as I mentioned on level." Resp 4 G2 "It's not there because of that (government policy IP). But within the University we have, we have (IP Policy). Its only that....do not have a structure." Resp 3 G2 "We don't have a national IP policy but as an institution we have our policies." Resp 4 G2 "At Botho, the IP belongs to the school facilities. And usually that's the bottom line. That's the standard. Even for.......one international...." Resp 4 G2 "The owner of the idea, the faculty, and then the university. There is like... and for the incubatees, they are not students. They are incubatees. So, for them we have an MOU, you make a small contract, and you must only pay 5% of the .... price as royalties. Because incubation cannot happen if you start getting 40% IP of it. We will never come to you. And it is not our mandate. We want to have factories, having companies then we will get more royalties" Resp 2 G2	Internal Governance Policy IP Ownership
"We have got collaborations with other HEI for example, we collaborate with Ashesi, we collaborate with university of .... so many collaborations. And then...." Resp G2	Collaboration with other HEIs International HEIs
"Yes, we work very close with our industry partners. We have something that is called Industry Reference Forum. Where we are meeting like this with the industry guys and we have dinner with them and we talk to them, they tell us about their programs, we also tell them about our experience, tell them the challenges." Resp 4 G 2 "They don't want to train them, they want you, to bring... what' called plug and play, plug and play. They don't want to spend any money training anybody. Resp 4 G2 "Not necessarily NGOs, they are basically like banks. We have partners with many banks in Botswana" Resp 4 G2	Enabling Market Industry networks
"I think, so far, the government of Botswana for example does not have a national IP policy. So, you need to note that it is not an enabler. Because you see as an institution, yes, we have our own IP policy but that has to be aligned to the national IP policy. Otherwise, we will be doing things which are...." Resp 4 G2 "But Prof also the IP learnt in the country is still very young. You know we don't have a lot of that kind of high-end product research. Research that comes up with a product. And for the simple reason that most of the products that are sold in Botswana are already manufactured" Resp 4 G2	Government Policy IP requirements

"Yeah, you must work with regulators although we are registered. So, we must always be in full compliance in terms of our program, accreditation, in terms of facilities, in terms of all of that. Those are our stakeholders." Resp 4 G2	Government Regulators
"Yes, we use that for our CSR. Orphanages, trusts." Resp 4 G2 "Yes, I mean sometimes work with local community libraries. Yeah, we work with all that." Resp 4 G2 "No, it's not business. And regulators also." Resp 4 G2	NGOs / Community Organisation partnership

Table B2. Fireside Group 2 (G2) Focus Group Discussions

Representatives from INST9, INST12, INST13, INST7 (Consisted of five participants: one woman and four men)	Themes
"Job creation" Response (Resp) 2 G3 "Yeah. Our vision and mission which is stated through our quality policy, which says, we aim to produce an employable globally viable graduate with the right kind of attitudes, skills, knowledge and competencies for value creation towards sustainable economic growth for the nation and region." Resp 3 G3 "African Union vision. Agenda 2063." Resp 3 G3 "So, the idea of all of this that we do comes from that quality policy statement that we have. Now, when you say you're producing an employable graduate with the right kind of attitude, knowledge, skills and competencies right for value creation, right, positive value creation towards growth, sustainable economic growth." Resp 3 G3 "Now, when you look at this, then you align the vision of whichever country we are, we are in 4 countries right now. Botswana being the headquarters. Lesotho, Namibia, eastward Kenya right. 4 countries. They have their own vision like Lesotho has vision 2020. Botswana, which is finishing, is finished, now they are working towards a new vision. Botswana had vision 2030. Similarly, eastward Kenya has its vision 2025 and Namibia had its vision 2025. And you look at those visions, they are aligned to the African Union vision." Resp 3 G3 "To patent for new dimensions to subject new ideas to research, job creation. This job creation is quite unique. I don't think it was highlighted even in the ones we stated here." Resp 1 G3 "Aspirations...entrepreneurial questions with innovative individuals research and development that's novels, improves innovation and patterns in venture capital creation" Resp 2 G3	HE Aspirations Job creation Employable Graduates Agenda 63 Attitude, Knowledge, competencies Alignment with National strategic plans National/Continental policy Contribution to socioeconomic development Job creation Research, Innovation and Development
"And that's smart you know, and limit your focus on smart KPI's for us. Because you know every six months you sit down and review and when you sit down and review, we then get to report which is the...which also is kind of motivation for people." Resp 3 G3	Measurement Smart KPIs
"Teach them theory, there's a limit to it." Resp 3 G3 "Student Engagement Techniques and Activities. We do that to keep the student engaged. This is design thinking. Design thinking is all about getting you a problem and letting you go through the whole process step by step, find out the solution, right." Resp 3 G3 "Activities, you mentioned capacity building activities, collaboration with others and curriculum inclusion." Resp 1 G3 "In the social media lab is where you subject most ideas to facebook, to whatsapp. Those social media.... you channel them through that. We have a lab of social media which does that." Resp 4 G3	HEI Activities Student Engagement Design Thinking Capacity Building Curriculum Idea testing Research, Innovation and Development

"entrepreneurial questions with innovative individuals research and development that's novels, improves innovation and patterns in venture capital creation" Resp 2 G3	Entrepreneurship Mindset
"Activities include creating entrepreneurial mindset through teaching, entrepreneurship and mentorship" Resp 2 G3	Teaching about entrepreneurship
"But when you get them engaged, because they're not engaging with you. They are engaging with their peers. You could see them debating right." Resp 3 G3	Mentorship Peer engagement
"And you now, actually what you're doing is trying to make them learn from prototyping, right, you have created an idea, you have found all your enablers, you have found all your impediments, you have done analysis of your risk involved, you have found mitigating factors." Resp 3 G3	Prototyping
"There is a concept called instructional scaffolding, okay. Many people do not use it, because the term instructional scaffolding, what is this term?............... Can you reach to the top without taking a second step. But for you to go to the second step, you have to go to the first step, then the second and the third and the fourth, and maybe the next step is your last step." Resp 3 G3	Instructional Scaffolding
"And that's instructional scaffolding. So, you get the students into the class, and then you tell them develop this capacity, capability and competency. Right. Once you have done that, then you go and develop these competencies. Because for you to develop that, you need this"	Capacity, capability, competency
"Some of the enablers include incubation centres, social media labs and partnering with industry" Resp 1 G3	Industry partnership
"Family business. Oh, interesting. Because right now, most of the angel investors are family business owners, they have...." Resp 3 G3	Funding
"You always find something as an issue, right? But you should be ready to review what you have done and implement measures that can further improve it. So, there is continuous quality improvement cycle that you have to go through also becomes very important. And that continuous quality improvement cycle is key." Resp 3 G3	Internal Governance Policy Quality improvement
"QMS culture we call it as continuous quality improvement cycle, right. And continuous improvement cycle, we use different words, but..." Res 3 G3	
"Intellectual property protection is very important you see. I think that one is also one of the enablers. Intellectual property rights to be protected." Resp 2 G3	Intellectual Property
"And that's where the culture of an organisation comes into completion" Res 3 G3	Culture Quick Wins
"I think it's incumbent upon a university or an institution to look at the low hanging fruit, which ones are cheaper to implement." Res 2 G3	
"And, you know, I recall, at the leadership level, also, there's a lot of... design thinking happens." Resp 2 G3	Leadership
"There are some industry players who are utilising students' ideas without paying. For example, we had a chain of supermarkets in our country. They are very good at scouting innovators. And in fact, they took a student who had innovated a payment system, a POS system. They made him a manager. But the moment they were done with these ideas, he was fired. But the idea remained. You know patenting it, that was very bad." Resp 2 G3	Industry Linkage Governance policy

Table B3. Fireside Group 3 (G3) Focus Group Discussions

Representatives from INST4 (Consisted of seven male participants)	Themes
". The university also has to transform in some way. Where students also learn from what they see. You can't keep telling students about entrepreneurship and they don't see you being entrepreneurial at all. The university itself is struggling to pay debt you know." Response (Resp) 4 G4 So I think, the university should also transform to be an entrepreneurial university where it is creating products, selling and making money and involving staff and students in the process otherwise we are not practicing what we preach. Resp 4 G4 "Now, this is exactly what he did. So, over the seven- year period that he was the Vice-Chancellor, he got them to actually start businesses very intentionally." Fac 1 G4 ". Create a solution and the university fronts the selling. So first the university will use it. So he spoke about an SIS that they developed. The university used it and then he went out and at every platform he was selling the SIS -and 10% was coming to the university and 90% was going to the developers" Fac 1 G4	HEI Aspirations Entrepreneurial University Spin off
"….he had a start-up. Now that meant he probably followed that process in year two, he didn't care about it but it was already sowed in him and as soon as he saw an opportunity, he has been taught how to recognize the opportunity" Resp 1 G4 "And once you recognize the opportunity and you have been taught about the process then it becomes a lot easier. So coming back to your point, there are many ways of measurement. You can measure through how those students that finish and join employment how are they different from others and you can get that feedback from their employers." Resp 1 G4 "So, once you build the mindset… and that's why I argue with people that don't be fixated about measurement. It's good to measure, just like you can have dataset to be able to predict certain things. But beyond that, don't kill yourself around it." Resp 1 G4 "During the KPI's he is talking about" Resp 2 G4 "You start a business, it does not make sense, it fails, it takes some time, by the time it will come out of the value of sorrow is when you know that you have learnt from your past mistakes. So a business without a value of sorrow will not succeed, but once you've learnt from your past mistakes definitely it will succeed."	EE measurements Start-up Opportunity recognition Measurements Mindset Data KPIs Value of Sorrow
"My institution operates different ventures which bring in money which is used to augment the income from the students. We hopefully are going to be more deliberate about that, and also try to see how to make sure that our entrepreneurial programs are very very effective" Resp 3 G4 "So when we look at the process of entrepreneurship, it has to do with research. You don't just wake up one morning and set up a business. A whole number of things are involved." Resp 3 G4 "And if we as Higher Institutions of learning will start having that mindset, maybe we will be able to become truly knowledge holders. We could be able to transfer this knowledge." Resp 3 G4 "If everybody is entrepreneurial in nature, not necessarily a function of opening a business but that process, if every lecturer, if every professor, goes through that, why should we sit down in Africa here, with all the professors we have and we will not be able to achieve anything or will not be able to make significant progress in solving our problems." "To share an experience, we encourage staff members to bring in guest	HEI Activities Venture creation Entrepreneurial programmes Research Knowledge transfer Spin offs

lecturers, people for the industry, people from the business world."	
"So at the end of the day, if your IP is not coming in then to be honest we will not be doing quality research. I was given some manuscripts to review." Resp 3 G4	Guest Lectures Research and Innovation –IP
"The sustainable source of funding is third stream, which is what you are saying. Which include also alumni funding, includes corporations, includes business. So the first stream and second stream are just to balance the waters. If we don't have third stream activities" Resp 6 G4	External Funding
So this is about how the university can generate funds for itself to even support more students. So you are generating funds that support the work of the university anyway so it's not like you are deviating from what the institution does. It is just creating more support for other things that we do. It is something that is self-sustaining. Resp 8 G4	Internal Funding
"I was just wondering if this is problem other institutions encounter where the concept of generating revenue to keep yourself sustained can be confused with being a for-profit institution." Resp 7 G4	self-sustaining
"But they are not for-profit because every activity within universities are centred on the students. For example, when we make any surplus there are areas you focus. One, scholarship for students" Resp 2 G4	
"provision of seed money for starting of enterprises for students or organizing institutional issues within the university." Resp 2 G4	Seed funding

Table B4. Fireside Group 4 (G4) Focus Group Discussions

Authors

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