

Higher Education and Its Contribution to Economies of African Countries: Move Towards Competence-Based and Skills Demand-Driven Standards in Collaboration with Industry

Eustache Tanzala Kikasu¹, Yunus Goolam Doba², Strinivasan Soondrasan Pillay¹ & Gustave Mungeni Kankisingi³

¹ Department of Public Management and Economics, Durban University of Technology, South Africa

² Department of Wholesale and Retail Leadership Chair, Durban University of Technology, South Africa

³ Department of Marketing and Strategy, Cardiff Metropolitan University, United Kingdom

Correspondence: Eustache Tanzala Kikasu, Department of Public Management and Economics, Durban University of Technology, South Africa.

Received: August 30, 2024

Accepted: November 22, 2024

Online Published: January 14, 2025

doi:10.5539/jel.v14n3p21

URL: <https://doi.org/10.5539/jel.v14n3p21>

Abstract

This study explores the ecosystemic impacts of higher education (HE) on the economies of African countries, emphasizing the need for competence-based, and skills-demand-driven standards in collaboration with industry. HE is vital for equipping individuals with essential knowledge and skills for socio-economic transformation. However, in Africa, this role has weakened, with industry assuming a leading position. Curricula in HE institutions are slow to adapt to the skills needed by industries, leading to a range of challenges such as outdated curriculum delivery, desertion of technical and vocational training, inadequate research resources, insufficient collaboration frameworks between HE and industries, minimal support for entrepreneurship, and poor infrastructure. Aligning HE curricula with industry skills requirements is crucial for enhancing African economic development and competitiveness. Unfortunately, there is a notable lack of partnerships and practical mechanisms for curriculum integration among African HE institutions, which results in graduates possessing skills that do not meet industry demands. This paper reviews the extensive literature on HE's role in African economies, advocating for in-depth collaboration between HE and industry in order to tackle skills mismatches. Accordingly, establishing a healthy partnership between HE institutions and industries could facilitate work-integrated learning, encourage industry-led curriculum development, and prepare graduates with applicable skills and relevant knowledge for the job market. Thus, developing a proactive framework that can facilitate and enforce collaboration between higher education and industries could be critical in addressing the challenges faced by African economic development.

Keywords: African economic growth, disruptive technologies, higher education, industries collaboration and partnerships, work-integrated learning programmes

1. Introduction

Higher education plays an instrumental role in contributing to economies by equipping individuals with knowledge, skills, and competencies necessary for socio-economic transformation and development (Pee & Vululleh, 2020). A well-educated fit for purpose workforce can contribute to innovation, productivity, better margins and economic growth in the manufacturing, technology, services, and agriculture industries (Mbithi et al., 2021). Higher education also served as hubs for research, innovation, and entrepreneurship. It contributes to job creation by producing skilled graduates who possibly will start their own businesses or be employable (Smolentseva, 2023). According to Asrif and Fatmi (2024), conventionally, universities and institutions of higher learning were driven by thinkers, philosophers, generators of ideas, innovators, and concept developers to shaping the future of society by educating and empowering individuals, advancing knowledge and research, promoting social mobility, fostering critical thinking and diversity, and serving the community (Chankseliani et al., 2021). Unfortunately, the roles of universities and institutions of higher learning have been shifted and switched with industry assuming this role. A proliferation of digitization which includes cloud computing, blockchain, data analytics and internet of things is reshaping business strategies (Hussain, 2024; Agrawal & Narain 2023; De Villiers, 2021). Therefore, deplorably, institutional programmes and curriculums are responding lethargically, instead of advancing in

innovation. Currently most African institutions of higher learning are playing ‘catch-up’ due to the reversal of roles as industries evolve and lead, whilst knowledge providers follow (Maravalle & Pandiella, 2023). Higher education in African countries is confronting disruptive technologies among a multitude of challenges such as the delivery of a relevant curriculum; neglecting technical and vocational training; limited funding and resources for research and development activities; lack of collaboration between higher education and industries; minimal support and promotion of entrepreneurship graduates; and inadequate infrastructure, amongst others (Adewolu, 2024; Pāvāloaia & Necula, 2023; Moodie, 2016).

In addition, aligning higher education programmes with the skills required by industries remain a key challenge for African economic development and competitiveness. Due to the emerging of disruptive technologies, skills developed by African universities are not meeting industries’ skills driven demand (Qi, 2022; Bongomin et al., 2020; Mbithi et al., 2021; Irene, 2019). There is a paucity of partnerships and practical mechanism with industries in terms of developing and integrating curriculum amongst African higher education institutions (Moshtari & Safarpour, 2024; Kruger & Steyn, 2024). This disconnected scenario contributes to the production of irrelevant skills acquired at universities and the relevant skills required by industry. Accordingly, in order to promote African economic development and competitiveness, there has to be an alignment between skills required by industries and environmental transformation with institutions that have to respond consequently (Zhuang & Zhou, 2023). Greater engagements between industry and knowledge providers can bridge the gap between theory and practice. Therefore, sections of this paper explore and examine the role of higher education in the economies of African countries, focusing on the importance of competence-based and skills demand-driven standards with industries. This paper suggests that adopting an in-depth collaborative and partnerships approach between higher education and industries can proactively address the current issue of skills mismatch affecting African economic development, and produce competent graduates required by the industry (African economies). Consequently, a well-established partnership between higher education and industry could enhance opportunities for work-integrated learning programmes development, induce industry-led curriculum development, and enable graduates to seamlessly enter the job market with practical skills and relevant knowledge. This implies that a competence-based and skills demand-driven approach to higher education can significantly contribute to the economic growth and development of African economies. The section that follows discusses the background and rationale of ecosystemic impacts of higher contribution to African economies.

2. Background and Rationale of Ecosystemic Impacts of Higher Education Contribution to African Economies

The African 2063 agenda envision a prosperous, inclusive, and sustainable Africa, where all citizens have access to quality education and opportunities for growth and development (Mlambo et al., 2022). In recent years, there has been a growing recognition of the importance of higher education in Africa’s development agenda. The African Union’s agenda, for example, emphasizes the need for increased investment in higher education to ensure the continent’s competitiveness in the global economy (Mlambo et al., 2022; Ufomba, 2020). This suggests that there’s an urgent need to improve educational curricula to match industry requirements, to better guarantee that graduates have the necessary skills for the labour market on the continent. Therefore, African higher education institutions are required to play a crucial role in this vision, as they are central to fostering innovation, entrepreneurship, and skills development that are essential for driving economic growth and development in Africa. It was indicated earlier that Higher education’s role is to shape socioeconomic development in a variety of ways. It is widely recognized that a strong higher education sector is essential for fostering economic development, promoting innovation and entrepreneurship, and building a skilled workforce (Saravanakumar & Ponniah, 2023). In addition, universities are key drivers of research and innovation, producing new knowledge that can be applied to address societal challenges and drive economic growth. The impact of higher education on ecosystems can be seen through various factors such as research and innovation, skill development, job creation, and economic growth (Sairmaly, 2023). One of the key contributions of higher education to economies in African countries is to generate new knowledge and technologies that can drive economic growth and improve the quality of life for citizens. Research in areas such as agriculture, healthcare, renewable energy, and information technology can lead to advancements that benefit society (Rafiana, 2024). Higher education also contributes to the development of a skilled workforce that is vital for driving economic growth. By providing quality education and training, universities help individuals acquire the necessary skills and knowledge to enter the workforce and contribute to the economy (Sairmaly, 2023). This, in turn, can lead to increased productivity, competitiveness, and innovation in various sectors of the economy. Moreover, higher education institutions are also important drivers of job creation. Universities and colleges employ a significant number of staff and faculty members, as well as support staff development in various fields (Teixeira et al., 2021). Additionally, the research and innovation activities undertaken by these institutions can lead to the

creation of new businesses and industries, which can further contribute to job creation and economic development. This implies that higher education is expected to play an instrumental role in fostering economic development in African countries by promoting research and innovation, skill development, job creation, and economic growth (Bajrami & Leka, 2020). By investing in higher education collaboration with industries, African governments and stakeholders can unlock the full potential of their economies and create a more sustainable and prosperous future for their citizens.

Accordingly, initiatives such as the African Higher Education Harmonization and Quality Assurance Programme have been launched to improve the quality and relevance of higher education on the continent. Earlier, it was demonstrated that African higher education's institutions are experiencing various ecosystemic barriers, which are negating the production of relevant skills for employability. Cole (2022) and Zavale (2018) stated that challenges hindering higher education and its contribution to African economies include mainly the Lack of industry-academia collaboration, limited access of youth (specially, female) to higher education, lack of quality education (irrelevant and mismatch skills for employability), funding constraints, brain drain, political instability, etc. Various research affirmed that in Africa, graduates struggle to obtain jobs after graduation because of discrepancies between the expectations of the labour market and their educational background (Areba, 2024; Ongiti, 2024). Addressing these challenges and investing in higher education is crucial for African countries to harness the potential of their human capital and contribute effectively to their economies. This may require increased investment in education, strengthening academic institutions, promoting industry-academia collaboration, and creating a conducive environment for learning and research (Areba, 2024). Challenges listed above, and many others, if not addressed effectively will continue to hinder higher education contribution to the economies of African countries in terms of producing employable skilled workforce. In South Africa, the Human Sciences Research Council (HSRC) survey found that about 31% of South African companies attested that graduates' lack of skills for employability is a major deterrent to hiring them. This suggests that there is a critical issue of skills (mismatch) required by industries and those that are generated through higher education institutions (Mseleku, 2022; Moni, 2021).

In addition, the survey indicated that some graduates are left with no option but to do volunteer work in companies, expecting that volunteering can lead to employment obtainment. Most companies want experience and not only one year's experience but 2- or 3-years' experience. This implies that volunteering for job experiences in any area or field in the form of apprenticeship-internships can probably offer career development opportunities. Accordingly, colleges and universities need to work with industry partners to identify the new skills that are needed and add them to the curriculums to solve the issue of fit-for-purpose skills. By providing students with the knowledge and skills needed to succeed in the modern economy, universities could help meet the demands of both the public and private sectors for a highly educated workforce. This, in turn, can lead to fostering innovation and entrepreneurship, increased productivity, competitiveness, and economic growth. Fostering collaboration between higher education institutions and industry in Africa, can reenact the role played by high education in nurturing mutual understanding and cooperation, promoting social cohesion and inclusivity, the culture of innovation, and supporting entrepreneurial activities (Rafiana, 2024; Kayyali, 2023). Higher education institutions can also drive economic development and create new opportunities for growth, and build stronger and more resilient communities, which are essential for driving economic development. Consequently, considering that universities are hubs of research and innovation, where new ideas are generated and tested, partnership and collaboration with the industry could enhance the potential for higher learning institutions to contribute significantly to economic growth, social development, and sustainable transformation of African economies. This denotes that investing in an ecosystemic approach that promote higher education-industry partnership, and support its role in driving innovation, entrepreneurship, and workforce development, African countries can unlock the full potential of the role to be played by universities in contributing and achieving long lasting economies prosperity. The ecosystemic approach development may be essential to increase trend for graduates to turn to entrepreneurship and contribute to an evolving economic growth in Africa. Due to intense market competition and globalisation, education in the modern period needs to adapt quickly in order to keep up with the rapid changes in industry and commerce (Gorlach, 2017). The next section discusses the materials and methods used in this paper.

3. Materials and Methods

3.1 Methods

This study explored and examined literature on Higher Education Institutions (HEIs) and its contribution to economies of African countries by emphasising the competence-based and skills demand-driven standards in collaboration with industry. According to Booth et al. (2021) and Snyder (2019), literature review is one of the crucial steps in the research process, and a valuable method for collecting data. In this study, literature review assisted to critically analyse previous research studies on specific issues or challenges affecting partnership and collaboration between HEIs and industries in Africa (Chigbu et al., 2023; Popenoe et al., 2021). It helped reviewing, analysing, and synthesizing existing research findings to identify patterns, trends, and gaps in line with the aim of this study. The goal was to provide an overview of the current state of knowledge on the impact of an effective and efficient collaboration and partnership between HEIs and African economies (industries). Therefore, an extensive literature review guided the researchers to establish the key features fostering the relationship between Industries-Higher Education Contribution (I-HEC) to African economies. An active and resourceful collaboration and partnerships with HEIs and industries was examined in order to present an approach that can facilitate and support such partnership. Practical illustrations of case studies are provided, where partnership and collaboration between universities and industries contributed successfully to the economies of countries where those universities and industries are located. Accordingly, the approach to facilitate the contribution of HEIs to African economies is suggested in this study.

3.2 Materials

Higher education and knowledge creation have been the purview and realm of universities for millennia, functioning as centres of excellence that produce professionals and practitioners in their fields while contributing to the economy. Universities served as beacons and hubs of invention and creativity, resolving a wide range of social ills and economic dilemmas. However, a new wave of digital disruptive technologies and innovations, driven primarily by diverse economic sectors, has created a gap between the quality and relevance of what universities produce and the new demands of a developing economy (De Waal & Maritz, 2022). The pendulum of innovation has shifted, with industry now driving the pace of innovation and intervention as it constantly reinvents itself as an organization to meet market demands. Higher education institutions (HEI) are following industry as the value chain of employability, with education provision as a vital link, faces disruption in preparing fit-for-purpose and work-ready graduates for economic activity (Alenezi et al., 2023). HEIs-industry collaboration in developing countries differs from developed countries (Hazelkorn, 2020). Establishing effective HEIs-industry linkages invoke the need for sustained efforts and commitments, considering that developing countries have little experience with industrial engagement and little managerial capacity for research as a result of historical challenges rooted in cultural and institutional impediments that require time to overcome (Guimon, 2013). In this context, HEIs-industry collaboration in Africa tends to be largely informal focusing narrowly on recruiting university graduates for staffing, internships, and consulting (Mgonja, 2017). However, the taxonomy “teaching-research-entrepreneurial” that characterizes the commercialization and profit-making-centred collaboration must be leveraged to a broader purpose of enhancing social and economic development (Brundenius, Lundvall et al., 2009; Berggren, 2017). Considering the above description and understanding of collaboration between HEIs and industry, key concepts and theories aligned to higher education and its contribution to African economies are discussed as a foundation for facilitating the flow of arguments toward competence-based and skill-demand-driven standards in conjunction with industry.

3.2.1 Conceptual and Theoretical Frameworks Aligned to I-HEC

According to Ray et al. (2023), the theoretical framework that is most aligned with the concept of “Higher Education and its contribution to economies of African countries, competence-based and skills demand-driven standards in collaboration with industry” is the Human Capital Theory (HCT). The HCT, developed by Gary Becker (1964), posits that investments in education and training can lead to increased productivity, economic growth, and social mobility (Winterton & Cafferkey, 2019). This theory emphasises the importance of developing skills and competencies that are in demand by the labour market, particularly in industries that are critical to the economy (Tholen, 2022). Furthermore, the HCT suggests that higher education institutions should focus on providing students with relevant skills and competencies that are aligned with the needs of the industry, thereby enabling them to make a positive contribution to the economy (Porkodi et al., 2023). This aligns with the concept of “competence-based and skills demand-driven standards”. Additionally, Bischoff (2018) asserted that the HCT highlights the importance of collaboration between higher education institutions and industry stakeholders to ensure that education and training programmes are relevant and effective (this relates with the concept of

“universities collaboration with industry”). Table 1 displays the theoretical frameworks that are relevant to Higher Education and its contribution to economies of African countries.

Table 1. Theoretical frameworks relevant to Higher Education and its contribution to economies of African countries

Theories guiding ecosystemic impacts HEI into African economies.	Specific contributions of HEI into African economies.
<p>Human Capital Theory: This theory posits that education increases human capital, which is a key factor in economic growth (Ray, 2023)</p>	<p>HEI produce skilled graduates: Higher education institutions in Africa can produce highly skilled graduates who can contribute to economic development, innovation, and entrepreneurship and fill labour gaps in key sectors such as agriculture, healthcare, technology, and finance.</p>
<p>Social Learning Theory or Social Capital Theory: This theory suggests that individuals learn new behaviours, attitudes, and values by observing and imitating others. It also suggests that social relationships and networks can facilitate knowledge transfer, collaboration, and innovation between higher education institutions and industry stakeholders (Birasnav, et al. 2019; Dubos & Cook, 2017).</p> <p>Institutional Theory: This theory emphasises the importance of institutional structures and arrangements in shaping economic outcomes (Peters, 2022).</p>	<p>Higher education institutions in Africa can provide the following: a platform for students to learn from peers, mentors, and role models, which can foster social cohesion and community development. It can also foster innovation and entrepreneurship. Higher education institutions can incubate innovative ideas, support entrepreneurship, and provide training on business development and management.</p> <p>Conduct research and development: Higher education institutions can conduct research on local challenges and develop solutions that address pressing issues such as healthcare, energy security, and environmental sustainability. Higher education institutions in Africa can serve as institutional anchors, promoting economic development by providing skills training, research, and innovation.</p>
<p>Neoclassical Theory: This theory assumes that economic growth is driven by factors such as technology, capital accumulation, and institutional frameworks (Villanueva, 2023).</p>	<p>Build partnerships and collaborations: Higher education institutions in Africa can contribute to economic growth by producing graduates with skills in emerging technologies, such as renewable energy and information technology. Higher education institutions can build partnerships with industry stakeholders, government agencies, and other organizations to drive innovation, entrepreneurship, and economic growth.</p>
<p>Endogenous Growth Theory: This theory suggests that economic growth is driven by internal factors, such as innovation, human capital, and technological progress (Nwaiwu, 2024).</p>	<p>Promote local integration: Higher education institutions in Africa can stimulate endogenous growth by fostering innovation, entrepreneurship, and research collaborations. It can also promote local/national or regional integration by providing cross-border education programmes, fostering research collaborations, and developing national or regional networks.</p>
<p>Triple Helix Theory: This theory proposes that universities, industry, and government should collaborate to drive innovation and economic growth (Galvao et al., 2019; Feola, et al., 2019).</p> <p>Economic Development Theory: This theory emphasizes the importance of economic development in reducing poverty and inequality (Schumpeter, & Swedberg, 2021; Todaro, & Smith, 2020).</p>	<p>Promote collaboration: Higher education institutions in Africa can play a critical role in facilitating these collaborations, which can lead to innovative products, services, and processes.</p> <p>Promote economic development: Higher education institutions in Africa can contribute to economic development by providing skills training, entrepreneurship support, and research capacity that addresses local needs and challenges.</p>
<p>The Resource-Based View of the Firm (RBV) Theory: This theory suggests that firms compete by possessing unique resources and capabilities, which can be developed through investments in education and training. This theory posits that firms' competitive advantage is derived from their unique resources and capabilities (Freeman, 2021; Miller, 2019)</p>	<p>Resources and capabilities: Higher education institutions in Africa can develop resources and capabilities that are valuable to the economy, such as research capacity, entrepreneurial skills, and innovation.</p>
<p>The Knowledge-Based Economy (KBE) Theory: This theory emphasises the importance of knowledge creation and diffusion in driving economic growth (Kurantın, 2021; Phale, 2021).</p>	<p>Knowledge creation and diffusion: Higher education institutions in Africa can contribute to developing human capital and innovation.</p>

Source: Birasnav, et al. (2019) and Mbithi et al. (2021).

Table 1 elucidates the theoretical frameworks that are relevant or support higher education institutions and its contribution to economies of African countries. These theories highlight that higher education institutions in Africa can contribute to shaping the ecosystemic impacts of their countries' economies by producing skilled graduates, fostering innovation and entrepreneurship, conducting research and development, building partnerships and

collaborations, and promoting local, national, or regional integration. It also indicates that higher education institutions can contribute to economic growth, poverty reduction, and sustainable development. All these theories are relevant and supportive to fostering partnership and collaboration between HEI and industries. The closest theories that link with Industry-High Education Contribution (I-HEC) are Human Capita Theory (HCT) and Triple Helix Theory (THT). These two theories support the ideas that partnership and collaboration between High Education Institutions (HIIs) and Industries can contribute to economic development, innovation, and entrepreneurship and fill labour gaps in key sectors of the economy (Ray, 2023; Galvao et al., 2019; Feola et al., 2019). A well ecosystem or partnership and collaboration between universities, industry, and government is expected to drive innovation and economic growth through producing highly skilled graduates who can participate to economic development of the continent. Higher education institutions in Africa can facilitate these collaborations, which can lead to innovative products, services, and processes. Accordingly, the HCT emphasises the importance of developing skills and competencies that are relevant to the labour market, particularly for industries that are critical to the economy. Therefore, industries collaboration and partnerships with higher education institutions, Work-Integrated Learning programmes, disruptive technologies, future skills development, and economic growth are among the critical concepts that are elaborated for ease of understanding of the ecosystemic approach expected to facilitate collaboration and partnership between higher education institutions and industry in Africa. These concepts are explained and discussed as follows:

1) Higher education institutions

Higher education institutions are established learning organisations that provide students with high level of knowledge, skills, and qualifications needed to succeed in their careers and contribute to society. It is typically defined as education beyond high school or secondary school (Ehlers & Kellermann, 2019). These institutions offer a range of academic programmes, including undergraduate and graduate degrees, professional certifications, and research opportunities (Ruben et al., 2023). In any country, higher education institutions play various roles in terms of educating, training, and preparing fit-for-purpose and work-ready graduates for socio-economic activities (Al-Kurdi et al., 2020). Higher education institutions can be categorised as follow (De Wit & Altbach, 2021):

- **Universities:** These are institutions that offer a wide range of academic programmes, including undergraduate and graduate degrees, at the bachelor's, master's, and doctoral levels. These institutions focus primarily on conducting research and publishing scholarly articles, and they often have a strong reputation for academic excellence (Breneman & Haarlow, 2007). Examples include Durban university of Technology, University of Kwa-Zulu Natal, University of Zulu Land.
- **Colleges:** These are institutions that offer a more limited range of academic programmes, typically focusing on undergraduate degrees in a specific field or discipline. These institutions prioritize teaching and student learning, often with a focus on vocational or professional training. Examples include community colleges, technical schools, and universities that emphasize practical skills training (National Center for Education Statistics, 2020).
- **Institutes of Technology:** These are institutions that focus on providing technical and vocational education, often with a focus on science, technology, engineering, and mathematics (STEM) fields (National League for Nursing, 2020).
- **Graduate Schools:** These are institutions that offer advanced degrees, such as master's and doctoral degrees, in a specific field or discipline (De Wit & Altbach, 2021).
- **Professional Schools:** These are institutions that offer specialized training in a specific field or profession, such as law, medicine, engineering, or business (National League for Nursing, 2020).
- **Online Universities:** These are institutions that offer online courses and degree programmes, allowing students to complete their education remotely (Muir et al., 2018).
- **Open Universities:** These are institutions that offer flexible and open enrolment policies, allowing students to pursue their education without traditional constraints (Daniel & Marquis, 2013).
- **Research Universities:** These are institutions that prioritize research and scholarship alongside teaching and learning (Breneman & Haarlow, 2007).
- **Liberal Arts Colleges:** These are institutions that focus on providing a broad-based education in the humanities, social sciences, natural sciences, and mathematics (Kuh & Gonyea, 2018).
- **Distance Education Institutions:** These institutions offer courses or degree programs primarily through distance learning methods such as online or correspondence courses. Examples include universities like the University of London International Programmes and the Open Polytechnic in New Zealand (Taylor & Brown, 2018).
- **Specialized Colleges:** These are institutions that focus on providing education in a specific field or discipline,

such as art colleges, music colleges, or culinary colleges (National League for Nursing, 2020)

- **For-Profit Universities:** These institutions are driven by profit motives and often have a focus on vocational or professional training (Heller & Younger, 2012).

In the African continent, all these categories of higher education institutions are expected to be collaborating and partnering with the industry in order to play a critical role in providing students with the knowledge, skills, and qualifications needed to succeed in their careers and contribute to socio-economic activities of the continent. They are also expected to produce highly skilled and educated individuals who are equipped to take on leadership roles in various sectors, fostering innovation, entrepreneurship, and economic growth, while also promoting social mobility, community engagement, and local development (Halstead, 2022; Peter, 2021; Isenberg & Onyemah, 2016). In addition, higher education institutions' mission is to transfer knowledge and expertise to industries, leading to innovation and competitiveness in various sectors; conduct research that leads to the development of new technologies, products, and services, which can be commercialized and contribute to the continent's economic growth (Abramowitz et al., 2024). Furthermore, higher education institutions' mission is to foster entrepreneurship by providing students with the skills and knowledge to start their own businesses, creating jobs and stimulating economic growth; train students for specific industries and professions, ensuring that the workforce has the necessary skills to meet the demands of the economy (Olo et al., 2021). Moreover, higher education institutions' mission is to provide education and training opportunities to students from underprivileged areas, promoting economic growth and reducing disparities among people; contribute to social mobility by providing access to education for individuals from disadvantaged backgrounds, enabling them to improve their socio-economic status; engage with local communities through outreach programmes, community service projects, and partnerships, which can lead to positive social and economic outcomes; contribute to economic diversification by promoting the development of new industries, such as technology, healthcare, and renewable energy (Kesten, 2019). Olo et al. (2021) emphasised that higher education institutions' mission is to stimulate local economic development by creating jobs and attracting investment; develop initiatives that address specific socio-economic challenges, such as poverty reduction, healthcare, and environmental sustainability; collaborate with local and international partners toward promoting cultural exchange, research cooperation, and economic development; etc (Kesten, 2019).

2) Industries collaboration and partnerships with higher education institutions

Industries collaborating and partnering with higher education institutions can be described as Industry-Higher Education Collaboration (I-HEC), which refers to the mutually beneficial partnership that has to be established between industries and higher education institutions to achieve specific goals, solve problems, and advance knowledge and innovation (Vlk, 2023; Bean, 2021). In African economies, the role of industries in shaping collaboration and partnership with Higher Education Institutions (HEIs) is crucial for driving economic growth, innovation, and competitiveness. Industries can identify the skills gaps that exist in the workforce and communicate these needs to HEIs, enabling them to develop relevant curricula and training programs. For example, in most developed countries, collaboration and partnerships with higher education institutions has often occurred in the following sectors (O'Neill et al., 2024; Vlk, 2023; Rossouw, & Goldman, 2023):

- **Technology and IT:** Tech companies like Google, Microsoft, and IBM partner with universities to develop new technologies, provide internships, and conduct research projects.
- **Healthcare:** Pharmaceutical companies like Pfizer, Johnson & Johnson, and Merck collaborate with universities to develop new treatments, conduct clinical trials, and provide internship opportunities.
- **Aerospace and Defense:** Companies like Boeing, Lockheed Martin, and Northrop Grumman partner with universities to develop new technologies, provide research funding, and offer internship opportunities.
- **Energy and Utilities:** Companies like ExxonMobil, Shell, and Duke Energy collaborate with universities to develop new energy technologies, provide internship opportunities, and conduct research projects.
- **Manufacturing:** Companies like General Electric, 3M, and Siemens partner with universities to develop new manufacturing technologies, provide internship opportunities, and conduct research projects.

This illustration shows that the collaboration between industries and higher education institutions is essential for fostering a strong ecosystem of innovation, entrepreneurship, and economic growth. According to Rybnicek and Königsguber (2019), improved student outcomes, enhanced industry relevance, increased innovation, better workforce development, enhanced reputation for both parties, increased funding opportunities, improved employer engagement, increased visibility, greater sustainability, etc., are among the benefits that can result from collaborations and partnership between industries and higher education institutions (Ahmed et al., 2022; Tseng, 2020; Li, 2020). Examples of successful partnerships and collaboration between universities and industries include:

- **Partnerships between Stanford University and Google:** Stanford University has a strong partnership with

Google, which provides funding for research projects, offers internship opportunities, and collaborates on developing new technologies (Wang et al., 2019; Lee, 2018).

- **University of California, Berkeley, and Tesla:** Tesla has partnered with the University of California, Berkeley to develop new electric vehicle technologies, provide internship opportunities, and conduct research projects (University of California, 2020).
- **Harvard University and Microsoft:** Harvard University has a partnership with Microsoft to develop new technologies, provide internship opportunities, and conduct research projects in areas such as artificial intelligence and machine learning (Harvard University, 2020).

These industries and HEIs collaborations were based on entrepreneurial practices where the external motivations and internal initiatives are encouraged to promote a university that is innovative, entrepreneurial and sustainable. According to Brennan et al. (2018), collaboration between higher education institutions and industries can lead to the development of new technologies, products, and services, driving innovation and economic growth. In most countries worldwide, innovative vision of the role of the university as a promoter of start-ups has emerged as a key ingredient in the creation of new techno-economic conurbations. In Africa, universities seem to be left behind in terms of industry-HEIs collaboration and partnership. Universities in Africa should consider the environmental and economic circumstances of its surrounding region, focus on future ambition for that region by defining its mission on university–industry interactions, collaboration and partnership. Considering the above illustration, Table 2 presents benefit as well as challenges aligned to HEIs-industry collaboration and partnership.

Table 2. Potential benefits and challenges aligned to HEIs-industry collaboration and partnership

Benefits of industries collaboration with higher education institutions	Challenges hindering HEIs-industries collaboration
<p>Talent development: Industries can access a pool of skilled and knowledgeable graduates who are equipped with industry-specific skills. Partnerships ensure that students are equipped with the skills and competencies required by industries, reducing recruitment challenges, and increasing job readiness.</p> <p>Research and development: Industries can partner with universities to develop new technologies and products that can drive innovation and growth.</p> <p>Internship opportunities: Industries can provide internship opportunities to students, which can help them gain practical experience and build their skills.</p> <p>Workforce development: Industries can work with universities to develop customized training programmes that meet the industry’s specific needs.</p> <p>Knowledge sharing: Industries can share their knowledge and expertise with universities to help them develop curriculum that is relevant to industry needs. Collaboration fosters knowledge sharing between industries and universities, promoting the transfer of expertise and best practices.</p> <p>Innovation and Competitiveness: Collaboration drives innovation, improves competitiveness, and enhances the ability to respond to changing market conditions.</p> <p>Cost Savings: Partnerships can reduce costs associated with research, development, and training by leveraging the resources of both parties.</p> <p>Increased Visibility: Industry-higher education partnerships can increase visibility for both parties, enhancing reputation and credibility.</p> <p>Improved Community Engagement: Partnerships can foster community engagement, promoting economic development and social welfare.</p>	<p>Lack of communication: Industries may not always communicate effectively with universities about their needs and expectations. Effective communication is crucial to overcome language barriers, differing terminology, and varying expectations.</p> <p>Different cultures: Industries may have different cultures and expectations than universities, which can lead to misunderstandings.</p> <p>Funding: Industries may not always have the resources to fund research projects or provide internship opportunities. Funding gaps between industries and universities can hinder collaboration efforts.</p> <p>Time-consuming: Partnerships can be time-consuming to establish and maintain.</p> <p>Cultural Barriers: Different cultures and values within industries and universities can create barriers to effective collaboration.</p> <p>Lack of Trust: Initial trust-building is essential to establish successful partnerships.</p> <p>Different Goals: Industries may prioritize short-term goals, while universities focus on long-term research and education objectives.</p> <p>Industries and higher education institutions may have different priorities and objectives: This can limit both parties to come together to discuss their needs and expectations for the partnership.</p> <p>Political instability: Political instability in certain African countries can also hinder the growth of higher education institutions and their contribution to the economy. Unstable governments may not prioritize education and may even interfere with academic freedom, leading to a decline in the quality of education and research.</p>

Source: Rossoni et al. (2023); Lis (2021); Ibeme (2020) and Brennan, et al. (2018).

Table 2 describes the benefits and challenges related to industries collaboration with higher education institutions. When examining the key challenges hindering HEIs contribution to the African economies, Horton, et al. (2020); Mwabu (2019) and Akamani (2018) asserted that many African HEIs are facing limited resources, including

funding, infrastructure, and human capital. In addition, numerous African students, which are pursuing higher education abroad never want to return to the continent, leading to a brain drain and a loss of skilled talent for the home country. The low relevance of education is another critical issue affecting partnership between HEIs and industries, given that the curriculum and content of many African HEIs are not relevant to the needs of the local economy, making it difficult to attract employers and stimulate innovation. Furthermore, a number of HEIs in Africa are lacking the necessary infrastructure or resources to support research and innovation, which limit their impact on the economy (Horton et al., 2020; Akamani, 2018). This suggests that limited partnerships between HEIs and industry can limit the transfer of knowledge and skills to the private sector. However, IHEC could be essential for mutual benefit and growth. By establishing effective partnerships, industries can access a pool of skilled graduates, develop new technologies, provide internship opportunities, and conduct research projects. Universities can benefit from industry partnerships by gaining access to resources, expertise, and funding for research projects. Therefore, the best practices toward ensuring productive collaboration between industries and higher education institutions may include the following (Kolade et al., 2021; Sjöo & Hellström, 2019):

- Invest in research infrastructure and capacity building to support research and innovation.
- Encourage entrepreneurship and innovation through incubators, accelerators, and start-up programmes.
- Develop strategies to retain skilled talent in Africa rather than losing them to brain drain.
- Collaborate with other African HEIs to share knowledge, expertise, and resources.
- Establish clear goals: Establish clear goals and objectives for the partnership to ensure that both parties are working towards the same objectives.
- Communicate effectively: Communicate effectively with each other to ensure that both parties are aware of each other's needs and expectations.
- Develop customized solutions: Develop customized solutions that meet the specific needs of the industry.
- Foster a culture of collaboration: Foster a culture of collaboration between industries and universities by promoting mutual respect and understanding.
- Build Trust: Foster open communication, mutual respect, and trust among partners.
- Develop a Shared Understanding: Ensure that both parties understand each other's goals, values, and expectations.
- Establish a Governance Structure: Define a clear governance structure to facilitate decision-making and conflict resolution.
- Encourage Continuous Communication: Regularly communicate progress, challenges, and concerns to ensure effective collaboration.

Understanding the benefits, challenges, and best practices of industry-higher education collaboration can effectively drive innovation, develop talent, and achieve shared goals. In addition, effective collaboration between industries and higher education institutions is crucial for driving economic growth and social development (Kolade et al., 2021; Mwabu, 2019). The importance of industry-HEIs collaboration has been widely recognized, and various studies have identified the key factors that contribute to successful partnerships. HEIs-industry collaboration requires a shared understanding of goals and objectives, open communication, mutual benefits, flexibility, clear roles and responsibilities, co-creation/co-production, and a strong partnership framework. However, according to De Wit and Altbach (2021) and the National League for Nursing (2020), I-HEC can take various forms, including:

- **Research Partnerships:** Industries collaborate with universities to conduct research projects, share knowledge, and develop innovative solutions.
- **Co-Curricular Programmes:** Industries partner with universities to design and deliver co-curricular programmes, such as internships, mentorship programmes, and project-based learning.
- **Talent Development:** Industries work with universities to develop and train students for specific roles, ensuring they possess the skills and competencies required by the industry.
- **Professional Development:** Industries collaborate with universities to provide professional development opportunities for faculty members, enabling them to stay updated on industry trends and best practices.
- **Joint Research Initiatives:** Industries and universities jointly fund research initiatives to address specific industry challenges, develop new technologies, or solve complex problems.
- **Technology Transfer:** Universities license their intellectual property (IP) to industries, enabling them to develop and commercialize new technologies.
- **Incubators and Accelerators:** Industries partner with universities to create incubators and accelerators that support startups, entrepreneurs, and small businesses.
- **Industry-Led Curricula:** Industries work with universities to develop curricula that align with industry

needs, ensuring students are equipped with relevant skills and knowledge.

3) Work-Integrated Learning programmes

To facilitate collaboration and partnership between HEIs and industries in Africa, industries can offer Work-Integrated Learning programmes (internships and job opportunities) to students and graduates, providing them with hands-on experience and practical skills. According to Bernhardsson et al. (2020), Work-integrated learning (WIL) is an educational approach that combines academic learning with practical work experience in a real-world setting. It involves students working alongside professionals in a specific industry or organization to apply theoretical knowledge and skills in a practical context. The goal of WIL is to bridge the gap between academic theory and professional practice, providing students with a more comprehensive and relevant education. WIL can facilitate partnership and collaboration between higher education institutions and economies of African countries in several ways. According to Ferns et al. (2022), WIL encourages collaboration between higher education institutions and industries by promoting a culture of partnership and co-creation. This collaboration can lead to the development of innovative solutions, products, and services that address local economic challenges. WIL can enable higher education institutions to align their curricula with the needs of the industry, ensuring that graduates possess the skills required by the economy. This fosters partnerships between institutions and industries, as they work together to develop relevant skills. In addition, WIL can provide opportunities for students to develop practical skills, which can lead to increased employability and entrepreneurship. This, in turn, contributes to economic growth and development. Other crucial effects of partnership and collaboration between higher education institutions and economies of African countries take account of the following (Jowi, 2024; Nwokolo, 2023):

- WIL enables students to gain practical experience in industries, allowing them to share knowledge and best practices between academia and industry. This fosters a culture of knowledge sharing, which can lead to innovation and economic growth.
- WIL can facilitate research partnerships between higher education institutions and industries, focusing on applied research that addresses specific economic challenges. This can lead to the development of new technologies, products, and services that drive economic growth.
- WIL can lead to the creation of new employment opportunities, as students gain practical experience and are more likely to be employed by the industries they work with.
- WIL can inform curriculum development, ensuring that higher education institutions provide students with relevant skills and knowledge that meet industry needs.
- WIL can facilitate regional integration by promoting partnerships between higher education institutions across different African countries, leading to a more harmonized and coordinated approach to economic development.
- WIL can provide opportunities for teachers to develop their skills and knowledge, which can lead to improved teaching practices and better student outcomes.
- WIL can contribute to economic growth by developing a skilled workforce that is equipped to address local economic challenges, leading to increased productivity, innovation, and competitiveness.

Considering the above, the WIL programmes occur as a valuable approach to backing partnership and collaboration between higher education institutions and African economies (industries). This collaborative approach could help bridge the gap between academia and industry, leading to more effective problem-solving. WIL programmes can allow students to work on real-world projects with industry partners, providing them with hands-on experience and exposing them to industry challenges and needs. Konstantinou and Miller (2020) emphasised that WIL programmes provide opportunities for students to develop skills and knowledge relevant to the industry, ensuring they are job-ready and equipped to address the needs of African economies. It facilitates networking between students, industry professionals, and academics, fostering relationships that can lead to future collaborations, research partnerships, and job opportunities. Sobri et al. (2023) added that the essence of WIL is to stimulate innovative research collaborations between academia and industry, addressing real-world challenges and driving economic growth in African economies. Therefore, WIL programmes can inform curriculum development, ensuring that academic programmes are relevant and aligned with industry needs, thereby preparing students for successful careers in African economies. This implies that WIL programmes can facilitate the transfer of knowledge from academia to industry and from industry to academia, enabling the adoption of new technologies and best practices in African economies. According to Konstantinou and Miller (2020) and Sobri et al. (2023), to effectively implement WIL programmes, higher education institutions should:

- Establish research centers that focus on applied research addressing specific economic challenges in African countries.

- Build local, national and regional networks of higher education institutions and industries to facilitate collaboration and knowledge sharing.
- Establish strong partnerships with industries and stakeholders.
- Encourage partnerships between higher education institutions and industries to develop WIL programmes that align with industry needs.
- Develop curriculum frameworks that incorporate and align with industry needs and requirements, ensuring that graduates possess the necessary skills.
- Provide training for educators on WIL methodologies and industry needs, enabling them to develop relevant curricula.
- Provide opportunities for students to engage in project-based learning.
- Encourage entrepreneurship by providing resources and support for students to start their own businesses or social enterprises.
- Foster a culture of collaboration and innovation.
- Support the development of soft skills, such as communication, teamwork, and problem-solving.
- Encourage faculty engagement with industry partners.
- Develop mechanisms for monitoring and evaluating WIL programme effectiveness.

The focus to applying or implementing these WIL strategies, can facilitate partnership and collaboration between higher education institutions and economies of African countries, leading to economic growth, development, and competitiveness. The adoption of WIL approach by HEIs in Africa, can strengthen partnerships with industries, promote economic growth, and develop talent that is equipped to address the challenges facing African economies. Therefore, Lubbe and Svensson (2022) indicated that WIL can take many forms, including internships (students work part-time or full-time in a company or organization for a specific period, usually several months or a year); Co-op programmes (students alternate between academic semesters and work terms, typically lasting several months); project-based learning (students work on real-world projects or problems, often in collaboration with industry partners); industry-based research (students work on research projects in collaboration with industry partners, applying theoretical knowledge to real-world problems); service-learning (students engage in community-based projects or volunteer work, applying academic knowledge to real-world issues); apprenticeships (students work under the supervision of experienced professionals, learning skills and knowledge through hands-on experience); and practicum (students work on a specific project or problem under the guidance of a supervisor or mentor). According to Fleming et al. (2021), WIL as an approach to support HEIs and industry collaboration can provide numerous benefits, including practical application of theoretical knowledge; development of soft skills, such as communication, teamwork, and problem-solving; building professional networks and connections; enhanced employability and job readiness; increased student engagement and motivation; improved understanding of industry-specific challenges and needs; and opportunities for mentorship and guidance from experienced professionals. Overall, WIL could be a valuable approach to education that can help students develop practical skills, build professional networks, and prepare for successful careers.

4) Potential frameworks addressing partnership and collaboration between HEIs and industries engagement in Africa

There are several models suggested to address the need for partnership and collaboration between higher education institutions and industries in Africa (Achieng, 2023). Figure 1 presents models studied and suggested to address partnership and collaboration between higher education institutions and industries in Africa.

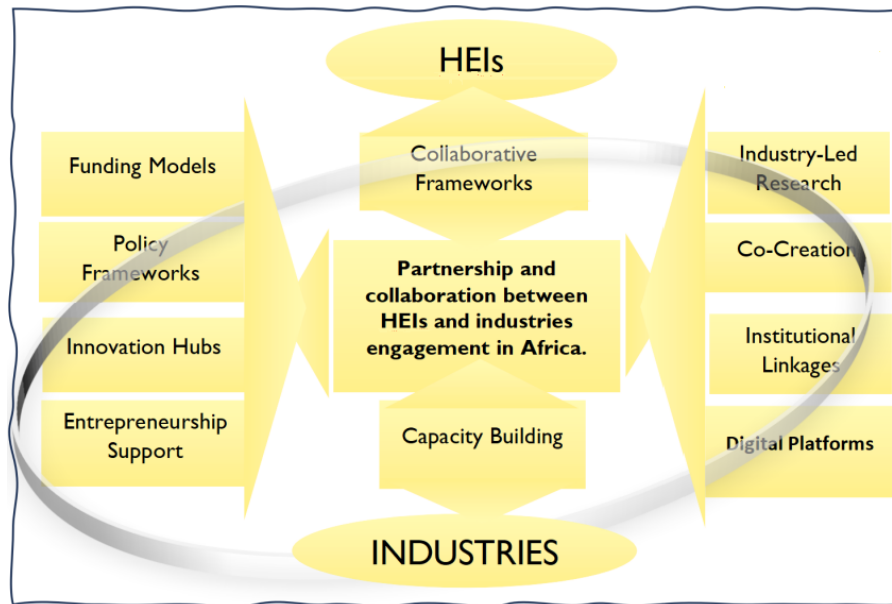


Figure 1. Framework addressing partnership and collaboration between HEIs and industries engagement in Africa

Source: Self-generated by the researchers.

Figure 1 demonstrates the frameworks that support mechanisms to enforce and improve partnership and collaboration between HEIs and industries engagement in Africa. Each framework or model presented in this figure was studied to strengthen partnership that could contribute to economic growth of African countries. These frameworks are explained as follow:

▪ Collaborative Frameworks

The African Union's Science, Technology, and Innovation (STI) strategy recommended the development of collaborative frameworks that bring together stakeholders from academia, industry, and government to co-create solutions and address common challenges affecting partnership and collaboration between HEIs and industries (Rossoni et al., 2023; Lis, 2021; Ibeme, 2020). The Triple Helix Theory underpins collaborative frameworks as it proposes that universities, industry, and government should collaborate to drive innovation and economic growth. It suggests that the development of a framework for collaboration have to outline the roles and responsibilities of all stakeholders, including the sharing of resources, expertise, and intellectual property. Through partnership with industries, HEIs can engage in collaborative research projects, leading to the development of new technologies, products, and services. This can help industries stay competitive and drive innovation in their respective fields. African governments can play a significant role in fostering collaboration and partnerships between HEIs and industries through developing and implementing policies, programmes, and initiatives that can help to create a favourable environment for innovation, entrepreneurship, and economic development. For example, African governments can facilitate public-private partnerships (PPPs) between HEIs, industries, and government agencies to develop joint projects and initiatives; and also enable international collaboration between HEIs, industries, and government agencies to leverage global expertise, knowledge, and resources. The examples of successful government initiatives in promoting collaboration and partnership between HEIs and industries in African economies include:

- The Nigerian Federal Ministry of Education has developed initiative to establish a National University-Industry Collaboration Platform (NUICP) to facilitate collaboration between universities and industries (The Nigerian Federal Ministry of Education, 2020; Adekunle & Adeyemi, 2019; Olumide & Bamidele, 2018).
- The South African Department of Science and Technology's (DST) has established the Technology Innovation Agency (TIA) to support innovation and technology development in partnership with HEIs and industries (South African Government, 2019; Kgari, 2018; Mouton & Goosen, 2017).
- The Kenyan Ministry of Education developed initiative to establish the Kenya Education Network (KENET) to facilitate collaboration between universities, industries, and government agencies (Shauri et al., 2024).

- The Ghanaian Ministry of Education established the Ghana Education Trust Fund (GETFund) to support education development, including collaboration between HEIs and industries (Adjei-Narh & Owusu-Ansah, 2020).

- **Industry-Led Research Approach**

In Africa, Industries can encourage HEIs to conduct research that is relevant to their industry needs, such as research on sustainable energy solutions or climate change adaptation. The University of Pretoria's Centre for Research on Science, Technology, and Innovation (CRSTI) suggested that industry-led research is essential to bridge the gap between academia and industry. This approach encourages industry to identify research needs and work with academia to develop solutions (Ahmed et al., 2022). They should identify shared goals and objectives and establish a clear understanding of the needs and goals of both the education institutions and industries, including the development of skilled workforce, innovation, and economic growth. The establishment of industry-led advisory boards could be essential to provide guidance and direction to education institutions on curriculum development, research priorities, and skill development. The Human Capital Theory and Tripple Helix Theory are also supporting Industry-Led Research framework for socio-economic transformation. The examples of successful industry-HEI partnerships in African economies include:

- The partnership between the South African Breweries (SAB) and the University of Cape Town's Graduate School of Business, which was initiated to develop a leadership development program for young managers (Bick & Sidubi, 2018).
- The collaboration between the Ghanaian oil company, Tullow Oil and the University of Ghana's College of Engineering to develop a curriculum for engineering students that addresses the industry's skills needs (ERIC, 2023).
- The partnership between the Kenyan coffee company, Sasini Tea & Coffee Ltd and the University of Nairobi's School of Business to develop a program for small-scale farmers on sustainable agriculture practices (Hussain et al., 2020).
- **Co-Creation**

The World Bank's "Higher Education in Africa" report highlighted the importance of co-creation in partnerships between academia and industry. Co-creation involves working together to identify problems, design solutions, and implement projects (Patricio et al., 2020). The Knowledge-Based Economy (KBE) Theory, which is linked with Co-Creation framework emphasises the importance of knowledge creation and diffusion in driving economic growth. Therefore, co-creation of solutions between education institutions and industries should be supported and encouraged in order to leveraging each other's expertise to address specific challenges. In addition, establishing mechanisms for sharing knowledge, best practices, and research findings between education institutions and industries should be stimulated.

- **Institutional Linkages**

Industries in Africa can collaborate with HEIs to address specific challenges and problems faced by the industry, such as improving supply chain management or reducing waste. Also, Industries can provide networking opportunities and connections between students, researchers, and industry professionals, facilitating collaboration and knowledge sharing. The African Association for Public Administration and Management (AAPAM) suggested the establishment of institutional linkages between higher education institutions and industries (Beiter et al., 2024). This can involve memorandums of understanding (MOUs), joint research projects, and exchange programmes. The Human Capital and Tripple Helix Theory relate to this framework as they support collaborations for Research and Development between Higher education institutions and industries on research and development projects, promoting innovation and entrepreneurship. They also encourage cross-disciplinary approaches to problem-solving, bringing together experts from different fields to address HEIs and industries complex partnership challenges. The exchange of knowledge between HEIs and industries can be mutually beneficial. HEIs can provide access to cutting-edge research and academic expertise, while industries can offer real-world challenges and opportunities for students to gain practical experience.

- **Capacity Building**

African Industries can provide mentorship and knowledge transfer to students and researchers, sharing their expertise and experiences to equip them with the skills needed to succeed in the industry. In addition, Industries can work with HEIs to develop bespoke training programs that meet their specific needs, such as customized training for employees or leadership development programs. The International Labour Organization (ILO) recommended capacity building for both academia and industry to develop the necessary skills and expertise for effective collaboration (ILO, 2022). The Human capital Theory relates to this framework, which posits that

education increases human capital, which is a key factor in economic growth. Therefore, HEIs and industry should collaborate to provide training and capacity-building programmes for educators, researchers, and industry professionals to enhance their skills and knowledge. Partnership with industries can help HEIs provide students with relevant skills and experience, making them more attractive to potential employers. This can also lead to increased employability and career opportunities for students.

▪ **Funding Models**

In Africa, industries can partner with HEIs to fund research and development projects that address specific industry needs, such as innovation in agriculture or manufacturing. The African Development Bank's (AfDB) "Higher Education Strategy" suggested the development of funding models that encourage public-private partnerships, philanthropy, and corporate social responsibility (Besada et al., 2024). Governments can provide funding to support partnerships and collaborations between higher education institutions (HEIs) and industries. This funding could be used to support joint research projects, technology transfer initiatives, and other collaborative activities. In addition, Industries can provide funding to HEIs to support collaborative projects that align with their research and development goals. This could include funding for joint research projects, internships, and other industry-academic collaborations. Also, HEIs and industries can apply for grant funding from external sources to support collaborative projects. This could include funding from national and international funding bodies, as well as from philanthropic organizations. Fostering strong relationships between HEIs and industries through regular communication and networking could facilitate public-private collaboration in terms of defining an appropriate finding model that can sustain a long-term partnership.

▪ **Policy Frameworks**

In Africa, policy challenges may exist in terms of regulatory frameworks that support or hinder collaboration between HEIs and industries. HEIs can engage with policymakers to provide insights on industry needs and challenges influencing policy decisions that can affect the industry. HEIs can also engage with local communities and industries to understand their needs and develop solutions that address these needs. The NEPAD (New Partnership for Africa's Development) Higher Education Programme recommended the development of policy frameworks that support partnerships between academia and industry (Mabula, 2022). This includes policies on intellectual property, innovation, and technology transfer. The government and policy makers can play a key role in fostering partnerships between HEIs and industries by providing funding, incentives, and support for collaborative projects. This can help enhance the overall productivity and competitiveness of both sectors. In other words, African governments are encouraged to support HEIs and industries partnerships through policies and regulatory frameworks that promote collaboration. Collaboration between HEIs and Industries can have a positive social impact by addressing social challenges and improving the well-being of communities.

▪ **Innovation Hubs**

Industries in Africa can partner with HEIs to develop innovative solutions that address specific industry challenges, such as developing new technologies or products. The African Innovation Hub Model, developed by the African Development Bank, aims to create innovation hubs that bring together academia, industry, and government to develop innovative solutions to address Africa's development challenges (Besada et al., 2024). The Tripple Helix Theory supports this framework as it promotes the establishment of innovation hubs or incubators that facilitate collaboration between education institutions, industries, and startups. This implies that engaging stakeholders from both education institutions and industries in regular meetings, workshops, and conferences could ensure that partnerships are mutually beneficial.

▪ **Entrepreneurship Support**

Industries in Africa can partner with HEIs to fund entrepreneurship initiatives, such as incubators and accelerators, that support the development of innovative startups. The University of Cape Town's Graduate School of Business suggested the provision of entrepreneurship support to academics and students to encourage them to turn their research into innovative products and services (Bick & Sidubi, 2018). Collaborative projects between HEIs and industries can have a positive impact on local, national and regional economies by creating jobs, stimulating investment, and promoting entrepreneurship.

▪ **Digital Platforms**

The African Virtual University's (AVU) e-learning platform suggested the use of digital platforms to facilitate collaboration between academia and industry through online courses, workshops, and conferences (Osuji, et al., 2024). Leverage digital platforms could facilitate collaboration, communication, and knowledge sharing between education institutions and industries. The HEIs and industry should regularly monitor and evaluate the

effectiveness of partnerships, identifying areas for improvement and adjusting as needed. These models aim to address the challenges hindering partnerships between HEIs and industries in Africa, including lack of trust, communication barriers, differences in culture and values, and limited resources. By considering and incorporating these components and strategies into a partnership framework, African higher education institutions can build strong relationships with industries, driving innovation, economic growth, and development on the continent.

▪ **Industry and Industry Synergy**

The influence of technology and customer trends has had an immense impact on industry, resulting in companies being more agile and pivoting to meet customer expectations at different levels. However, in Africa, higher education cannot keep pace with the industries evolutionary strides follow-on in the non-alignment of curriculum programmes and the production of mismatch skillsets. Advancement in technology usage in the industry progresses at a faster rate as compared to the pace of changes about the learning content at institutions of higher learning. Additionally, the depth of integration of industrial knowledge with the curricular system is limited. Zhuang and Zhou (2023) allude to the benefits of the development of synergies between higher education and industry, and consequently articulate a position that the learning experience of higher education has been empowered by the state-of-the-art technology from the industry. Wider collaboration can facilitate new knowledge points emerging in industry, which can be integrated in higher education programmes. With higher learning institutions and industry collaboration in place, knowledge gained from key technological practices and trends can be integrated into the university curricula. Such curricular knowledge inspired by technological evolution from the industry can influence the development and design of curriculum. Besides injecting industrial elements in academic programmes, industry will be able to readily employ graduates from partner institutions as graduates will have the knowledge base, technical know-how and working environment of companies in cases where students serve internships. A study conducted by Sun and Turner (2023) established that there was a positive effect of collaboration between industry and education institutions regarding apprenticeship programmes. It had improved work experiences and created a springboard for co-designing learning and competency development. The study tracked a graduate intern pursuing a career in higher education. The student gained hands-on experience and was a beneficiary of insights from the academic and corporate teams. Lecturers mentored the student from a research perspective (inclusive of research design, methodology, data collection and analysis). The industry-based mentors contextualized the work-based learning in terms of organizational structure, organizational culture, business operations and supervision. According to the Independent Uganda News (2024), a tracer study conducted by the Uganda Business and Technical Examinations Board (UBTEB Research Committee) established that 63% of the graduates get employed within one year after graduation, UBTEB graduates were more practically oriented, more skilled due to practical exposure and that graduates did not need more attention at the time of recruitment. Students knew and understood how to use hand tools and machines as compared to university graduates. The study also found that 20% of the graduates got employment in less than one month, 63% got a job within one year after graduation, and 37 % got employment after more than one year. 95% of the employers expressed positive satisfaction towards TVET graduates who were regarded as fit for the job market. Interestingly the study also recommended that the UBTEB should facilitate engagement between industry and educational programmes to meet job market needs and to ensure that the skills and knowledge imparted and assessed are in line with what employers require in potential recruits. There has to be an alignment of areas of study and skills requirements. This complementary approach of teaching and learning contributes to a balanced development of industry fit graduates. A synergistic approach to academia–industry collaborative education can reduce a disconnect between higher learning and industry and harvest and innovative ecosystem. This presents an evolved landscape with industry leaders and university academics joined at hip engaging in discourse on best practices, enhanced efficiencies and the effective manner on how to effectively prepare students for the world of work. Such partnerships could result in customized learning experiences and industry led teaching facilities driven by practitioners and academics (Zhuang & Zhou, 2023).

5) Disruptive technologies impacts on HEIs contribution to African economies

Disruptive technologies have the potential to significantly impact the contribution of Higher Education Institutions (HEIs) to African economies in several ways. These technologies are revolutionizing traditional industries and creating new opportunities for innovation and growth (Mugimu, 2021). HEIs are expected to play a crucial role in preparing the workforce for the challenges and opportunities presented by disruptive technologies, as well as in conducting research and development to drive technological advancements. One of the main ways in which disruptive technologies are impacting HEIs is by changing the nature of the skills and knowledge that are in demand in the labour market (Mbithi et al., 2021). As industries such as artificial intelligence, blockchain, and biotechnology continue to advance, there is a growing need for workers with specialized technical skills and

expertise. Furthermore, disruptive technologies are changing the way that education is delivered, with the rise of online learning platforms and virtual classrooms. HEIs are increasingly offering online courses and degrees, providing greater access to education for a broader range of students (Osuji, et al., 2024). This flexibility in education delivery is helping to unlock the potential of individuals who may not have had the opportunity to pursue higher education in the past, thereby contributing to a more skilled and educated workforce. Partnership between HEIs and industries is increasingly required to offer relevant programmes and courses in these emerging fields, to equip students with the skills needed to succeed in the digital economy. Additionally, disruptive technologies are creating new opportunities for collaboration between HEIs and industry (Fleming et al., 2021). HEIs and companies' partnership are essential to develop and commercialize new technologies, leading to the creation of new businesses and job opportunities. These partnerships also provide HEIs with access to cutting-edge research and development opportunities, further enhancing their contribution to economic growth (Horton et al., 2020; Akamani, 2018). Therefore, disruptive technologies have the potential to enhance the contribution of HEIs to African economies by driving innovation, creating new job opportunities, and fostering collaboration between academia and industry. Therefore, it is essential for HEIs to adapt to these changes and continue to evolve their programmes and research agendas to remain relevant in an increasingly digital world. However, disruptive technologies presents both challenges and opportunities to HEIs contribution to African economies. According to Chigbu et al. (2023); Mugimu (2021) and Popenoe et al. (2021), limited access to disruptive technologies is one of the major challenges facing Higher Education Institutions (HEIs) in Africa. Many HEIs in the continent lack the necessary infrastructure and resources to fully leverage disruptive technologies, making it difficult for them to make a significant contribution to the economy. As it was indicated earlier, HEIs in Africa often struggle with limited funding, which hinders their ability to invest in disruptive technologies. This lack of funding prevents HEIs from adopting and implementing new technologies that could help drive economic growth (Mugimu, 2021). Another challenge is the skills gap among students and faculty in African HEIs. Many students and faculty members lack the necessary skills and knowledge to effectively use disruptive technologies, limiting their ability to contribute to the economy. On the other hand, disruptive technologies provide HEIs in Africa with opportunities to foster innovation and entrepreneurship. By embracing these technologies, HEIs can create an ecosystem that supports the development of new ideas and businesses and contributes to economic growth (Sairmaly, 2023). Furthermore, disruptive technologies have the potential to improve access to education in Africa, particularly in remote and underserved areas. Online learning platforms and digital resources can help HEIs reach a larger audience of students, providing them with access to quality education and training. Accordingly, by integrating disruptive technologies into their operations, HEIs can play a significant role in driving economic growth in Africa. These technologies can help HEIs enhance their research capabilities, attract investment, and support the development of new industries and sectors (Kesten, 2019; Olo et al., 2021). Thus, while there are challenges to overcome, disruptive technologies also present significant opportunities for HEIs in Africa to contribute to the economy and drive sustainable development in the continent. By addressing the challenges and leveraging the opportunities, HEIs can play a crucial role in advancing innovation, entrepreneurship, and economic growth in Africa.

6) The impact of Disruptive technologies on Future skills development as a result of collaboration between HEIs and Industries.

Disruptive technologies such as artificial intelligence, blockchain, and virtual reality are rapidly transforming the way industries operate (Nkosi, 2022). This has significant implications for the skills needed in the workforce of the future. In order to ensure that students are prepared for the jobs of tomorrow, it is essential for higher education institutions (HEIs) to collaborate closely with industries. Collaboration between HEIs and industries allows for the development of curriculum that is aligned with the skills needed in the rapidly changing workforce (Chigbu et al., 2023). By working together, HEIs can ensure that students are learning the most up-to-date and relevant technologies and skills, and that they are able to apply these skills in practical settings. Furthermore, collaboration between HEIs and industries can provide students with real-world experiences that are crucial for their future success. By participating in internships, co-op programmes, and industry projects, students are able to gain hands-on experience with cutting-edge technologies and develop the soft skills necessary for success in the workplace. This suggests that the collaboration between HEIs and industries in response to disruptive technologies is essential for ensuring that students are prepared for the jobs of the future. By working together, HEIs and industries can ensure that students are equipped with the skills and experiences necessary to thrive in a rapidly changing workforce. HEIs collaborate with industries through research partnerships, internships, and work-study programmes. These partnerships facilitate knowledge exchange, technology transfer, and skills development, leading to the creation of industry-relevant curricula and the production of job-ready graduates (Popenoe et al., 2021). Moreover, they often engage in research and innovation activities that contribute to the development of

new technologies, products, and services. These disruptive innovations can lead to the creation of new industries, job opportunities, and increased productivity, thereby driving economic growth. Table 3 presents the positive and negatives impacts of disruptive technologies on future skills development as a result of collaboration between HEIs and Industries.

Table 3. Positive and negatives impacts of disruptive technologies on future skills development as a result of collaboration between HEIs and Industries

Positive impacts of disruptive technologies on future skills development	Negatives impacts of disruptive technologies on future skills development
<p>Disruptive technologies can provide new opportunities for skill development in emerging fields such as artificial intelligence, data analytics, and cybersecurity. This collaboration can enable universities and industries to design more relevant and up-to-date curricula to meet the demands of the future job market.</p> <p>By collaborating with industries to incorporate disruptive technologies into their programs, HEIs can better prepare students for the digital workforce. This can lead to increased employability and job prospects for graduates who possess the necessary skills to thrive in the ever-evolving technological landscape.</p> <p>The collaboration between HEIs and industries can foster innovation by creating a dynamic ecosystem where cutting-edge research and technology development can take place. This can lead to the creation of new products, services, and business models that drive economic growth and competitiveness.</p>	<p>The rapid pace of technological advancement can lead to a growing skills gap as HEIs struggle to keep their curricula updated with the latest disruptive technologies. This can result in graduates entering the workforce with outdated skills that do not align with industry demands, leading to underemployment and a mismatch between skills supply and demand.</p> <p>Collaboration between HEIs and industries in the development of future skills can exacerbate existing inequalities in access to education. Disruptive technologies require significant resources for implementation and training, which may not be evenly distributed among institutions or student populations. This can widen the gap between those who have access to cutting-edge technology and opportunities for skill development and those who do not.</p> <p>The focus on disruptive technologies in future skills development may lead to an overemphasis on technical skills at the expense of soft skills such as critical thinking, communication, and problem-solving. This can result in a workforce that is proficient in using technology but lacks the ability to adapt to change, collaborate effectively, and think creatively.</p>

Source: Adapted from Nkosi (2022); Mugimu (2021); Irene et al. (2019); and Mbithi, et al (2021).

Table 3 summarises some key impacts of disruptive technologies on future skills development as a result of collaboration between HEIs and Industries. According to Sairmaly (2023) and Mugimu (2021), HEIs can contribute to economic growth in African countries by producing skilled graduates who meet the needs of industries, driving innovation and entrepreneurship, and fostering collaboration between academia and the private sector. They can support entrepreneurship and business development through incubators, accelerators, and entrepreneurship programmes (Saravanakumar & Ponniah, 2023). Because of disruptive technologies and innovation, HEIs in Africa are required to provide continuous learning opportunities for professionals through executive education programmes, industry certifications, and skills development courses. This helps to upskill and reskill the workforce, making them more competitive and adaptable to the changing demands of the labour market. By fostering a culture of entrepreneurship among students and faculty, universities can contribute to the growth of small and medium-sized enterprises (SMEs), which are important drivers of economic development. Consequently, by considering disruptive technologies and investing in HEIs-industry partnership, African countries can build a strong talent pipeline, promote economic diversification, and achieve sustainable development.

7) Disruptive technologies impacts on partnership between HEIs and Industries

Disruptive technologies have the potential to significantly impact economic growth by driving innovation, increasing efficiency and productivity, and creating new markets (Chigbu et al., 2023). To harness the full potential of these technologies, it is essential for there to be effective partnerships between Higher Education Institutions (HEIs) and industries. By partnering with industries, HEIs can ensure that the research they conduct is relevant to the needs of the private sector and can be commercialized effectively. This collaboration can lead to the development of new products and services, the creation of start-up companies, and the growth of existing businesses (Mbithi et al., 2021). Industries, on the other hand, can benefit from access to cutting-edge research, talent, and resources that HEIs can provide. By working together, companies can gain a competitive edge in the global marketplace and drive economic growth through the adoption of disruptive technologies. However, the successful adoption and implementation of new technologies often requires collaboration between HEIs and industries. When HEIs and industries form effective partnerships, they can leverage their respective strengths and resources to accelerate the development and commercialization of disruptive technologies (Nkosi, 2022). HEIs

can provide cutting-edge research and expertise, while industries can offer real-world applications and commercialization opportunities. This collaboration can lead to the creation of new business models that drive economic growth and competitiveness (Mbithi et al., 2021; Irene et al., 2019). Table 4 displays the positive and negative impacts of disruptive technologies on economic growth as a result of effective partnership between HEIs and Industries.

Table 4. Positive and negative impacts of disruptive technologies on economic growth as a result of effective partnership between HEIs and Industries

Positive impacts of disruptive technologies on economic growth	Negative impacts of disruptive technologies on economic growth
<p>Disruptive technologies can spur new ideas and innovations, leading to the development of new products and services.</p>	<p>Disruptive technologies can lead to automation and job displacement, potentially resulting in higher unemployment rates in certain industries.</p>
<p>Disruptive technologies can boost productivity. By adopting disruptive technologies, industries can improve their efficiency and productivity, driving economic growth.</p>	<p>The rapid pace of technological change can create a skills gap, where workers do not have the necessary skills to adapt to new technologies, hindering economic growth.</p>
<p>Disruptive technologies can create new job opportunities in emerging industries, leading to economic growth and higher employment rates.</p>	<p>Disruptive technologies can increase inequality. Some individuals may benefit more from disruptive technologies than others, leading to increased income inequality and potentially widening the wealth gap.</p>
<p>Disruptive technologies can enhance competitiveness. Effective partnerships between HEIs and industries can help businesses stay competitive by keeping up with the latest technological trends.</p>	<p>Disruption of traditional industries. Disruptive technologies can disrupt traditional industries, leading to economic instability and potential job losses in those sectors.</p>

Source: Adapted from Mbithi, et al. (2021); Irene et al. (2019)

In addition to elements illustrated in Table 4, HEIs and industries can also address skills gaps and ensure that the workforce is prepared to take advantage of the opportunities presented by disruptive technologies. This can help to create a more dynamic and innovative economy that is better equipped to compete on a global scale. Furthermore, the partnership between HEIs and industries is essential for harnessing the full potential of disruptive technologies and driving economic growth. By fostering collaboration and knowledge sharing, both parties can create a thriving ecosystem that benefits society as a whole (Rafiana, 2024; Kayyali, 2023). Thus, HEIs partnership with industry can contribute to economic growth in African countries by producing skilled graduates who meet the needs of industries, driving innovation and entrepreneurship, and fostering collaboration between academia and the private sector. An effective partnership between HEIs and industries can help build a strong talent pipeline, promote economic diversification, accelerate the adoption and diffusion of disruptive technologies, leading to increased productivity, job creation, and economic growth (Nkosi, 2022). This collaborative approach can help to bridge the gap between research and industry, foster innovation, create a more dynamic and competitive economy, and achieve sustainable development.

3.2.2 Discussion About Successful Partnership Between HEIs and Industries Engagement in the Global Sphere

Most literature explored and examined revealed that globally, there is often a disconnected relationship between higher education institutions and industries in many countries, specifically in Africa, leading to a gap in skills needed for the job market (Mseleku, 2022; Moni, 2021). Collaboration between academia and industry is crucial for developing relevant curricula and research that can contribute to economic development. The quality of higher education in many African countries is often questioned, with issues such as outdated curricula, inadequate teaching methods, and a lack of qualified faculty members (Adewolu, 2024; Pāvāloia & Necula, 2023; Moodie, 2016). This hinders the development of the skilled workforce needed for economic growth and innovation. Many highly educated individuals in Africa are attracted to opportunities abroad due to better prospects and working conditions (Mwabu, 2019). This brain drain deprives African countries of their skilled labour force and intellectual capital, hindering their economic growth and development. Higher education institutions in African countries often struggle with limited funding, which affects their ability to invest in infrastructure, research, and human capital development (Sairmaly, 2023). This hampers their contribution to economic development through knowledge creation and innovation. Many African countries face challenges in providing sufficient access to higher education due to limited facilities and resources (Horton et al., 2020; Mwabu, 2019). This results in a large number of qualified students being unable to pursue higher education, impacting the country’s overall human capital development. However, literature revealed some strengths, weaknesses, opportunities, and challenges related to

partnership between HEIs and Industries in Africa. Table 5 presents some elements of strengths, weaknesses, opportunities, and challenges aligned with partnership between HEIs and Industries in the continent.

Table 5. Strengths, weaknesses, opportunities, and challenges aligned to partnership between HEIs and Industries in Africa

Strengths	<ul style="list-style-type: none"> ▪ Collaboration can lead to the development of innovative solutions and products that can benefit both the academic and industry partners. ▪ Access to industry expertise and resources can enhance the quality of education and research at the HEIs. ▪ Partnership can create opportunities for students to gain real-world experience through internships, co-op programs, or industry-sponsored projects. ▪ Industry partnerships can help HEIs secure funding for research projects and programs. ▪ Collaboration can facilitate knowledge transfer between academia and industry, leading to the development of a skilled workforce that meets the needs of the industry.
Weaknesses	<ul style="list-style-type: none"> ▪ Conflicting priorities and goals between HEIs and industries can create challenges in establishing effective partnerships. ▪ Differences in organizational culture, decision-making processes, and communication styles can hinder collaboration. ▪ Issues related to intellectual property rights and ownership can arise when working on joint projects. ▪ Limited financial resources on both sides can impact the sustainability of the partnership. ▪ Lack of clarity in roles and responsibilities can lead to misunderstandings and conflicts between partners.
Opportunities	<ul style="list-style-type: none"> ▪ Partnership can provide HEIs with access to cutting-edge technologies, equipment, and facilities that may not be available on campus. ▪ Collaboration with industries can create opportunities for students to engage in research projects that have real-world impact. ▪ Joint initiatives can help HEIs develop curricula that are aligned with industry needs and trends. ▪ Industry partnerships can lead to the commercialization of research outcomes and inventions, benefiting both the academic and industry partners. ▪ Collaboration can enhance the reputation and visibility of HEIs, attracting more funding, students, and research opportunities.
Challenges	<ul style="list-style-type: none"> ▪ Establishing and maintaining partnerships requires time, effort, and resources from both HEIs and industries. ▪ Balancing the goals and interests of both partners can be challenging, especially when priorities change over time. ▪ Differences in organizational structures and decision-making processes can impact the efficiency of collaboration. ▪ Managing expectations and overcoming potential conflicts or misunderstandings can be a challenge in partnership. ▪ Sustaining long-term partnerships may be difficult due to changes in leadership, funding, or priorities within HEIs and industries.

Source: Adapted from Besada et al. (2024); Ruben, et al. (2023); Mbithi et al. (2021); and Konstantinou & Miller (2020).

O'Dwyer, Filieri and O'Malley (2023) posit the role of the state in the Triple Helix as a perspective that university-industry collaboration networks are progressively becoming significant to national economies. However, universities are inherently viewed as "ivory towers" aloof from practice. According to Rossoni, de Vasconcelos and de Castilho Rossoni (2023), one of the main inhibitors to technology exchange is the cultural difference between industry and institutions with academics focused on publishing with freedom and industry preserving business intellectual property from the public domain. Furthermore, academic research projects are slower, and industry innovation is faster timelines. The transition from a theory-driven approach to a practice-driven approach cannot take place without industry playing an incremental role as education partners. The state can play an enabling role in stimulating and cementing the undeniable synergy by financing, coordinating, providing incentives, instituting favourable policies and being a conduit for economic gains (Zhuang & Zhou, 2023). O'Dwyer, Filieri and O'Malley (2023) further underscore the importance of public funding and its distribution in order to support industry evolution and competitiveness via collaboration between academic institutions and industry. Table 5 indicates that HEIs can undertake graduate programme by offering learning methodologies as a best fit for their respective societies and labour market needs. Therefore, it is shown that in most African countries, traditional universities are engaging minimally with industry and there appears to be an ivory tower 'us' (institutions) and 'them' (industry) approach. Over the past years universities of technologies and co-operative universities have been engaging with industry in work-based learning (Ferns, et al., 2022). But recently, a few Universities of Technologies (UoTs) in Africa, specifically in South Africa, have shed work-based learning experiences in some

qualifications and subsequently isolating these institutions from industry. They prevent or limit themselves to being relevant and making an impact in society. However, there exist successful cases of partnership between HEIs and Industries engagement in the global sphere. The following Table 6 shows a few global examples on how universities are branding themselves as defined by respective mottos and catchphrases.

Table 6. Global examples of successful partnerships between HEIs and industries branding themselves as defined by respective mottos and catchphrases

Institution	Country	Branding Motto
Panyapiwat Institute of Management	Thailand	Work Based Education-University of Networking framework (Arpia, 2016)
Chitralada Institute of Technology	Thailand	Work and study, study and work framework (Chaithanu, et al., 2020)
University of St Gallen	Switzerland	From Insight to Impact framework (Dardanelli & Mazzoleni, 2021)
Baden-Wuerttemberg Cooperative State University	Germany	The synergy between theory and practice framework (Ruhmann et al., 2022)
University of Waterloo	Canada	“In harmony with truth” framework (Whitehead & Huxtable, 2023)
Oxford University	United Kingdom	Impact from within framework (Torrance, 2020)

Unpacking the above Table 6 provides interesting trends across three northern hemisphere continents, namely Asia, Europe and North America. What is emerging is that there is a strong drive towards work-based education, which is impactful, linking education to work practice and being in harmony with truth. “Harmony with truth” is open to multiple interpretations. However, the University of Waterloo in Canada has a learning ethos that is deep-rooted in collaboration with industry and work-based learning (Waterloo University, website 2024; Whitehead & Huxtable, 2023). Universities are striving to have an impact on society and design academic programmes, which have an industry experience component. This can only be achieved if there is strong collaboration and engagement between institutions and industry. Discussion below is associated to the nature of partnerships between universities and industries. A number of few universities reviewed present an interesting array of engagement levels between universities and industry partners. The following university profiles were observed and examined:

▪ **Panyapiwat Institute of Management: Work Based Education-University of Networking framework.**

The Panyapiwat Institute of Management is a university based in Bangkok (Thailand). The institution’s philosophy is that various parts of society must work in harmony to create a balance between economic, environmental, and social factors of a country and the world for a sustainable future (Arpia, 2016). To reinforce corporate values and sustainability for the betterment of society, Work-based Education was established by PIM, leveraging industry proficiencies the of CP All Group which has a wide-range of businesses in agriculture, wholesale, and retail. Sectors., This partnership ensures that work-based learning takes and students receive practical experience. The institution is committed to producing academically skilled and job-ready graduates. The key focus of the university’s quality assured delivery is the development of people resources with knowledge and skills which are better aligned with market needs, business partners and associated industries. PIM’s work-based learning programmes are accredited by Thailand’s Office of the Higher Education Commission (OHEC). The university emphasises on moulding and creating a workforce that is better-quality aligned with private sector labour market demands. Companies are finding the need to build capacity and enhance the performance of their people resources. It therefore becomes critical to be innovative in the teaching methods utilized and learning processes created. There should be a definite aim of ensuring that academic staff members gain the necessary industry-based professional exposure. Moreover, as the university is industry driven the curriculum is shaped by a wealth of knowledge amongst academics who are experts in their fields. Lecturers possess industry experience and proficiency in respective fields. The knowledge imparted to students is practical know-how based on real-work situations. Lecturers visit students are workplaces during their practical engagement. This is dissimilar to universities turning to professionals when developing the curriculum. The hallmark of the model adopted allows for tailored made match to career aspirations and concurrently instilling amongst employers, that graduate enter the workplace work-ready and able to perform tasks proficiently. The high percentage of between 85–90% student employability rate confirmed by the institution points to the readiness graduates who are able to apply themselves seamlessly upon graduation. This according to the institution has to do with wide-ranging links and partnerships with financial institutions, the private sector and educational establishments. The link between industry and knowledge providers shapes and produces a workforce relevant to labour market needs. These institutional engagements across sectors augments a more holistic learning experience.

- **Chitralada Technology Institute: Work and study, study and work framework.**

Project Information Model (PIM) model of skills development and work-based learning is similar to Chitralada Technology Institute in Thailand, which is driven by an ethos of “**Study and Work – Work and Study**” within the context of work based and lifelong learning. The institute underscores the importance of technology and innovation, entrepreneurial potential, and the development of good people with skills, self-discipline, and professional ethics. The focus is on vocational training, close participation with industry, internal articulation from one learning tier to a higher academic tier, namely vocational certificate, Higher Vocational Certificate level and a Bachelors’ Qualification. Teaching and training are conducted by professionals with real experience in industry. The institutes’ curriculum is reviewed every 3–4 years in conjunction with industry meeting industry expectations. There are ongoing collaboration classes between the relevant institutional faculties and entrepreneurs towards developing competent graduates responding to demands from the industrial sector.

- **University of St. Gallen: From Insight to Impact framework.**

The University of St. Gallen emphasizes the transference of knowledge into practice (Dardanelli & Mazzoleni, 2021). The institution is driven by an agenda to produce graduates that play a vital role in aiding society, business and for the individual to thrive. The institutions believe that the best way to develop impact is through practical relevance, inspired by a commitment that it will benefit society at large. Academic programmes and research investigate questions that are relevant to business and society. The focus on impact leads to a more enthusiastic engagement and drive amongst students, a feature which attracts businesses and society at large, making graduates skills more employable.

- **Baden-Wuerttemberg Cooperative State University: The synergy between theory and practice framework.**

Baden-Wuerttemberg Cooperative State University collaborates with more than 9,000 private companies and social institutions throughout Germany (Ruhmann et al., 2022). Partner companies hand-pick students and are accountable for the practical component of the studies. Students shift between the university and the workplace learning, every 3 months, mirroring theoretical knowledge acquired with practical application integrating current developments. The methodology offers students to attain professional exposure and human interaction skills in actual contexts. Students are assigned an experienced company mentor to supervise and to develop relevant skills as students complete academic tasks assigned. As a result of the expert guidance during work-based learning students are competent to complete difficult work-related tasks upon graduation with no transition training required. The direct challenges of engaging in work activities in their professional journey also makes graduates more agile and highly employable. The institution is confident that its work-integrated approach contributes to more than 85% of our graduates securing permanent employment upon graduation. However, what contributes to such a significant absorption rate is the selection of the candidate by the company and a contract agreement signed. The positive factor of such an approach is the seamless transition into a profession with admirable career opportunities.

- **Waterloo of University: In harmony with truth” framework**

Waterloo University, in Canada, prides itself as a university propelled by research and an entrepreneurial energy where students benefit from a large scale paid cooperative and work-integrated learning programme with impact (Whitehead & Huxtable, 2023). The university is collaborative driven and is renowned for experiential learning and employer-student connections. More than 7500 active cooperative education employers make up the industry network for the institution which nurtures an entrepreneurial spirit creating over 5000 jobs. The institution’s motto “In harmony with truth”, although general in nature, resonates with the preparation of graduates for the world of work and entrepreneurship signalling relevancy of skills in accordance with the economy and labour market needs.

- **Oxford University: Impact from within framework.**

Oxford university’s Said Business School, in the United Kingdom, eloquently posit that business leaders need to have the necessary knowledge and skills to contributing to solving global issues (Torrance, 2020). The university, therefore, aims to empower students to shape industries, drive sustainability, and uplift communities. The intention is to grow leaders who go into business with a purpose and be impactful. Students have to be visionaries and problem solvers and the institutions value proposition of impact from within is encapsulated in “Transforming individuals, who transform businesses, which transform the world”. The emphasis on impact is significant in that qualification and skill sets imparted by the institution must utilized in meaningful ways towards enhancing transformation, innovation, and community upliftment from a globular perspective.

4. Recommendations Toward Promoting Partnership and Collaboration Between HEIs and Industries Engagements in Africa

The following recommendations are the few among many others that may assist to strengthen, support and promote partnership and collaboration between HEIs and Industries in Africa:

- Establishing formal partnerships. HEIs and industries in Africa should formalize their collaborations by establishing partnerships through Memorandums of Understanding (MoU) or formal agreements. This can help facilitate communication, alignment of goals, and commitment to joint projects.
- Creating joint research projects. HEIs and industries can collaborate on joint research projects that address common challenges or opportunities in their respective sectors. This can help bridge the gap between academic research and industry needs, and lead to innovative solutions.
- Providing internships and work placements. HEIs can work with industries to provide students with internships and work placements, giving them hands-on experience in their field of study and enhancing their employability. Industries can benefit from fresh perspectives and ideas from students, while also identifying potential future employees.
- Sharing knowledge and expertise. HEIs and industries can collaborate on knowledge-sharing initiatives such as guest lectures, workshops, and seminars. This can help facilitate the transfer of knowledge and expertise between academia and industry, leading to mutual learning and growth.
- Investing in infrastructure and technology. HEIs and industries can work together to invest in infrastructure and technology that support research and innovation. This can help create a conducive environment for collaboration and enable both parties to leverage each other's resources and expertise.
- Engaging in continuous dialogue. HEIs and industries should maintain open and ongoing communication to identify areas of mutual interest and opportunities for collaboration. Regular meetings, workshops, and forums can help facilitate this dialogue and strengthen relationships between the two sectors.

5. Conclusion

The ecosystemic impacts of HEIs and its contribution to the economies of African countries was examined considering competence-based and skills demand-driven standards in collaboration with industry. It is commonly acknowledged that HEIs plays an instrumental role in contributing to economies by equipping individuals with knowledge, skills, and competencies necessary for socio-economic transformation and development. This study demonstrates the significant benefits of promoting partnership and collaboration between HEIs and industries in Africa. It shows and proves that by working together, through fostering partnership and collaboration, HEIs and industries in Africa can drive innovation, enhance the skills and knowledge of students and workers, and contribute to economic growth and development in the continent. It is evident that forming strong partnerships can lead to mutually beneficial outcomes for both HEIs and industries, by eventually supporting and advancing a more sustainable and competitive workforce for the future. What emerged from a vast literature examined is that HEIs in the global north and in Asia are focused on the production of students who are fit for purpose, employable and impactful as change drivers. Their academic programmes go beyond a knowledge-based certification and churning graduates in a 'sausage-machine' manner. The knowledge produced and imparted is a co-responsibility of the producer (HEIs) and consumer (business and the economy). This co-responsibility entails knowledge production in curriculum planning and content delivery in terms of lecturer theatre-based theoretical knowledge, complemented by practical application at work sites guided by supervision and mentorship. Theoretical knowledge becomes dynamic as industry and economy changes, debunking seismic shifts due to technological disruption. Students placed at evolving contexts during work integrated learning are more agile having the ability to respond to a variety of contexts upon graduation. Moreover, the clarion statement emanating is about graduates being impactful and problem solvers. Impactful graduates are viewed as prepared to be agents of changes and being resourceful at worksites. Graduating students in large numbers who are not geared to make an impact or are pliable for a dynamic workforce required are a disservice to the economy. In Africa, although the intent is to engage HEIs with industry, the intention is intensive lacking commitment to employability beyond the internship period. HEIs are lacking industry participation in curriculum planning and development, relegating partnership to a 'tick-box' compliance. This study concludes that despite challenges hindering partnership and collaboration between HEIs and industry in Africa, there are many strengths and opportunities in supporting HEIs-industry partnerships. Industries and HEIs partnership and collaboration can help develop curriculum that is relevant to industry needs and promoting the transfer of expertise and best practices. Collaboration between HEIs and industries can drive innovation, improve competitiveness, and enhance the ability to respond to changing market conditions. But efforts are required to promote collaborations between government, HEIs and industries in terms of research and development projects, promoting innovation and entrepreneurship. To ensure an effective partnership between stakeholders, Human

Capital Theory and Tripple Helix Theory must be considered in order to tackling challenges and weaknesses hindering the building, development and sustainability of such collaborations. The foundation of the models of fit for purpose graduates should facilitate a close partnership between HEIs and industries. Unfortunately, there is a paucity of such a model in Africa. Thus, it is imperative for African stakeholders (governments, industries and HEIs) to support and invest in these collaborative efforts, as they have the potential to positively contribute to the overall prosperity and advancement of African economies.

Acknowledgments

Not applicable.

Authors' contributions

Dr. Eustache Tanzala Kikasu and Mr Yunus Goolam Doba were responsible for study conception, design and revising. They were also responsible for data collection and drafting the manuscript. Dr Strinivasan Soondrasan Pillay and Dr Gustave Kankisingi revised it. All authors read and approved the final manuscript. Dr Eustache Tanzala Kikasu and Mr Yunus Goolam Doba were the main contributors in this study. Dr Strinivasan Soondrasan Pillay and DR Gustave Kankisingi contributed with additional information related to the study, and critically assisted with reviewing and editing the manuscript. Corresponding author email: TanzalaK@dut.ac.za or tanzalakikasu15@gmail.com.

Funding

Not applicable.

Competing interests

There were no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Canadian Center of Science and Education.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

References

- Abramowitz, K., Fischman, W., & Gardner, H. (2024). Higher Education in the Twenty-First Century; What's the Mission? *Daedalus*, 153(2), 301–315. https://doi.org/10.1162/daed_a_02082
- Achieng, M. (2023). A Framework for Assessing the Role of Higher Education Pedagogies in Achieving Sustainable Development Goals in Africa. In *EDULEARN23 Proceedings* (pp. 4584–4593). IATED. <https://doi.org/10.21125/edulearn.2023.1219>
- Adekunle, A., & Adeyemi, O. (2019). University-Industry Collaboration in Nigeria: A Review of the Current Status and Challenges. *Journal of Education and Human Development*, 8(1), 1–10.
- Adewolu Ogwo, A. (2024). *Higher Education, skills development and students' preparedness for employability: a case study of the University of Lagos, Nigeria (towards a sustained practice approach with the triple helix model of innovation)*. Doctoral dissertation, UCL (University College London).
- Adjei-Narh, J., & Owusu-Ansah, A. (2020). Leveraging public-private partnerships for sustainable development: The case of the Ghana Education Trust Fund. *Journal of Public Administration and Policy Research*, 4(2), 1–15. <https://doi.org/10.1081/E-EPAP3-120025971>
- Agrawal, P., & Narain, R. (2023). Analysis of enablers for the digitalization of supply chain using an interpretive

- structural modelling approach. *International Journal of Productivity and Performance Management*, 72(2), 410–439. <https://doi.org/10.1108/IJPPM-09-2020-0481>
- Ahmed, F., Fattani, M. T., Ali, S. R., & Enam, R. N. (2022). Strengthening the bridge between academic and the industry through the academia-industry collaboration plan design model. *Frontiers in Psychology*, 13, 875940. <https://doi.org/10.3389/fpsyg.2022.875940>
- Akamani, A. K. (2018). Challenges facing African higher education institutions: A review of the literature. *Journal of Higher Education Policy and Management*, 40(3), 251–264.
- Al-Kurdi, O. F., El-Haddadeh, R., & Eldabi, T. (2020). The role of organisational climate in managing knowledge sharing among academics in higher education. *International Journal of Information Management*, 50, 217–227. <https://doi.org/10.1016/j.ijinfomgt.2019.05.018>
- Alenezi, M., Wardat, S., & Akour, M. (2023). The need of integrating digital education in higher education: Challenges and opportunities. *Sustainability*, 15(6), 4782. <https://doi.org/10.3390/su15064782>
- Altbach, P. G. (2017). The changing academic workplace: A global perspective. *Journal of Higher Education Policy and Management*, 39(3), 257–273.
- Areba, G. N. (2024). Redefining the Role of Higher Education in Africa: Panacea to Growing Global Skills Gap and Other Challenges. In *Advancing Student Employability Through Higher Education* (pp. 295–310). IGI Global. <https://doi.org/10.4018/979-8-3693-0517-1.ch016>
- Arpia, V. H. (2016). effectiveness of work-based learning curriculum of panyapiwat institute of management, Thailand. *AU eJournal of Interdisciplinary Research* (ISSN: 2408-1906), 1(1).
- Asrif, Y., & Fatmi, H. (2024). *A Cognitive Revolution: Generative Artificial Intelligence in Higher Education*.
- Bajrami, E., & Leka, B. (2020). Human capital and higher education as drivers of economy in Albania. *Regional Science Inquiry*, 12(2), 153–164.
- Bean, M. (2021). *Review of university-industry collaboration in teaching and learning*.
- Beiter, P., Guillet, J., Jansen, M., Wilson, E., & Kitzing, L. (2024). The enduring role of contracts for difference in risk management and market creation for renewables. *Nature Energy*, 9(1), 20–26. <https://doi.org/10.1038/s41560-023-01401-w>
- Berggren, E. (2017). Researchers as enablers of commercialization at an entrepreneurial university. *Journal of Management Development*, 36(2), 217–232. <https://doi.org/10.1108/JMD-06-2016-0117>
- Bernhardsson, L., Norström, L., & Andersson, M. (2020). *Work integrated learning and work integrated education: A study on learning processes and learning methods for working life* (pp. 4106–4112). In INTED2020 Proceedings. IATED. <https://doi.org/10.21125/inted.2020.1135>
- Besada, H., D'Alessandro, C., & Golla, T. (Eds.). (2024). *Routledge Handbook of Natural Resource Governance in Africa*. Taylor & Francis. <https://doi.org/10.4324/9781003017479>
- Bick, G., & Sidubi, F. (2018). Mitchell's Brewery: entrepreneurship challenges in the South African craft beer industry. *Emerald Emerging Markets Case Studies*, 8(4), 1–35. <https://doi.org/10.1108/EEMCS-06-2018-0101>
- Birasnav, M., Chaudhary, R., & Scillitoe, J. (2019). Integration of social capital and organizational learning theories to improve operational performance. *Global Journal of Flexible Systems Management*, 20, 141–155. <https://doi.org/10.1007/s40171-019-00206-9>
- Bischoff, K., Volkmann, C. K., & Audretsch, D. B. (2018). Stakeholder collaboration in entrepreneurship education: an analysis of the entrepreneurial ecosystems of European higher educational institutions. *The Journal of Technology Transfer*, 43, 20–46. <https://doi.org/10.1007/s10961-017-9581-0>
- Bongomin, O., Gilibrays Ocen, G., Oyondi Nganyi, E., Musinguzi, A., & Omara, T. (2020). Exponential disruptive technologies and the required skills of industry 4.0. *Journal of Engineering*, 2020(1), 4280156. <https://doi.org/10.1155/2020/4280156>
- Booth, A., Sutton, A., Clowes, M., & Martyn-St James, M. (2021). *Systematic approaches to a successful literature review*.
- Breneman, D., & Haarlow, B. (2007). *Securing an academic future: The future of higher education in America*.
- Brennan, M. A., et al. (2018). Industry-academia partnerships for social impact: A systematic review. *Journal of*

- Technology Transfer*, 43(1), 1–24.
- Chaithanu, K., Nuangpirom, P., & Ruangsiri, K. (2020). *A Development of Instructional Model Based on Work-Integrated Learning for New Generation of Graduates: Case Study of Fujikura Electronics (Thailand) Ltd* (Volume 122, pp. 456–468). In *The Impact of the 4th Industrial Revolution on Engineering Education: Proceedings of the 22nd International Conference on Interactive Collaborative Learning (ICL2019)*. Springer International Publishing. https://doi.org/10.1007/978-3-030-40274-7_45
- Chankseliani, M., Qoraboyev, I., & Gimranova, D. (2021). Higher education contributing to local, national, and global development: new empirical and conceptual insights. *Higher Education*, 81(1), 109–127. <https://doi.org/10.1007/s10734-020-00565-8>
- Chigbu, U. E., Atiku, S. O., & Du Plessis, C. C. (2023). The Science of Literature Reviews: Searching, Identifying, Selecting, and Synthesising. *Publications*, 11(1), 2. <https://doi.org/10.3390/publications11010002>
- Cole, L. (2022). Some Issues with Higher Education in Africa. *Hungarian J. Afr. Stud.*, 16, 61. <https://doi.org/10.15170/AT.2022.16.3.4>
- Daniel, J., & Marquis, E. (2013). *The concept of open university: A historical review*.
- Dardanelli, P., & Mazzoleni, O. (2021). Conclusions: Insights from Switzerland’s experience. In *Switzerland-EU Relations* (pp. 173–184). Routledge. <https://doi.org/10.4324/9781003038719-15>
- De Villiers, C., Kuruppu, S., & Dissanayake, D. (2021). A (new) role for business—Promoting the United Nations’ Sustainable Development Goals through the internet-of-things and blockchain technology. *Journal of Business Research*, 131, 598–609. <https://doi.org/10.1016/j.jbusres.2020.11.066>
- De Waal, G. A., & Maritz, A. (2022). A disruptive model for delivering higher education programs within the context of entrepreneurship education. *Education + Training*, 64(1), 126–140. <https://doi.org/10.1108/ET-03-2021-0102>
- De Wit, H., & Altbach, P. G. (2021). Internationalization in higher education: global trends and recommendations for its future. In *Higher education in the next decade* (pp. 303–325). Brill. https://doi.org/10.1163/9789004462717_016
- Dubos, R., & Cook, K. (2017). *Social capital: Theory and research*. Routledge.
- Ehlers, U. D., & Kellermann, S. A. (2019). *Future skills: The future of learning and higher education* (pp. 2–69). Karlsruhe.
- Eric, A. (2023). *Local Content Policy in Oil for Development Partnership Programmes: Are Universities and Technical Institutions Actively Engaged as Enablers of Sustainable Development?* Master’s thesis, University of Agder.
- Etzkowitz, H. (2022). Entrepreneurial university icon: Stanford and Silicon Valley as innovation and natural ecosystem. *Industry and Higher Education*, 36(4), 361–380. <https://doi.org/10.1177/09504222221109504>
- Federal Ministry of Education (Nigeria). (2020). *National University-Industry Collaboration Platform: A Framework for Enhancing Collaboration between Universities and Industries in Nigeria*. This document outlines the framework for the National University-Industry Collaboration Platform, which aims to facilitate collaboration between universities and industries.
- Feola, R., Vesci, M., Botti, A., & Parente, R. (2019). The determinants of entrepreneurial intention of young researchers: Combining the theory of planned behavior with the triple Helix model. *Journal of Small Business Management*, 57(4), 1424–1443. <https://doi.org/10.1111/jsbm.12361>
- Ferns, S. J., Rowe, A. D., & Zegwaard, K. E. (2022). *Advances in research, theory and practice in work-integrated learning. Enhancing Employability for a Sustainable Future*. London. <https://doi.org/10.4324/9781003021049>
- Fleming, J., Rowe, A. D., & Jackson, D. (2021). Employers as educators: the role of work placement supervisors in facilitating the transfer of skills and knowledge. *Journal of Education and Work*, 34(5–6), 705–721. <https://doi.org/10.1080/13639080.2021.1969343>
- Freeman, R. E., Dmytryiev, S. D., & Phillips, R. A. (2021). Stakeholder theory and the resource-based view of the firm. *Journal of Management*, 47(7), 1757–1770. <https://doi.org/10.1177/0149206321993576>
- Galvao, A., Mascarenhas, C., Marques, C., Ferreira, J., & Ratten, V. (2019). Triple helix and its evolution: a systematic literature review. *Journal of Science and Technology Policy Management*, 10(3), 812–833.

- <https://doi.org/10.1108/JSTPM-10-2018-0103>
- Gorlach, I. (2017). A success of University–Industry partnership. *New Trends and Issues Proceedings on Humanities and Social Sciences*, 4(6), 17–25. <https://doi.org/10.18844/prosoc.v4i6.2907>
- Guimon, J. (2013). *Promoting University-Industry collaboration in developing countries: The innovation policy platform*. World Bank, Washington DC. Retrieved from https://www.researchgate.net/profile/Jose-Guimon-2/publication/278961909_Promoting_universityindustry_collaboration_in_developing_countries_Innovation_Policy_PlatformOECD_and_World_Bank/links/5587eab408aeb0cdade0edd9/Promoting-university-industry-collaboration-in-developing-countries-Innovation-Policy-Platform-OECD-and-World-Bank.pdf
- Halstead, J. M., Deller, S. C., & Leyden, K. M. (2022). Social capital and community development: Where do we go from here? *Community Development*, 53(1), 92–108. <https://doi.org/10.1080/15575330.2021.1943696>
- Harvard University. (2020). *Harvard University and Microsoft announce a new partnership to advance the development of AI and machine learning*. Retrieved from <https://news.harvard.edu/gazette/story/2020/02/harvard-and-microsoft-partner-to-advance-ai-and-machine-learning/>
- Hazelkorn, E. (2020). *Relationships Between Higher Education and the Labour Market—A Review of Trends, Policies and Good Practices*. Retrieved from https://static1.squarespace.com/static/596e186fd7bdce7d9e7c0016/t/6051fbd9df1dd52ade8e4b69/1615985633769/The+Relationship+Between+Higher+Education+and+the+Labour+Market_FINAL+Updated+0720.pdf
- Heller, D., & Younger, M. (2012). *For-profit higher education: Developing a research agenda*.
- Horton, S., et al. (2020). Higher education in Africa: Trends and challenges. *Journal of Higher Education Policy and Management*, 42(2), 131–144.
- Hussain, F. (2024). The Impact of Technology on Modern Business Management. *Journal for Business Research Review*, 2(1), 72–84.
- Hussain, L. A. S., Inzoli, F., Golinucci, N., Stevanato, N., Rocco, M. V., & Colombo, E. (2020). *FEEM Approach to Supply Chain Analysis the Coffee Sector in Kenya*. <https://doi.org/10.2139/ssrn.3733699>
- Ibeme, N. P. (2020). Effect of university-industry linkages on commercialization of innovations of higher education: evidence from Enugu state, south-east Nigeria. *International Journal of Development and Management Review*, 15(1), 96–126.
- Independent Uganda News. (2024). *63% of TVET graduates get employed within one year*. Retrieved from [https://www.independent.co.ug/study-63-of-tvet-graduates-get-employed-within-one-year/#:~:text=Kampala%2C%20Uganda%20%7C%20THE%20INDEPENDENT%20%7C,and%20training%20\(TVET\)%20graduates.](https://www.independent.co.ug/study-63-of-tvet-graduates-get-employed-within-one-year/#:~:text=Kampala%2C%20Uganda%20%7C%20THE%20INDEPENDENT%20%7C,and%20training%20(TVET)%20graduates.)
- International Labour Organization (ILO). (2022). *Getting Skills Right Equipping Health Workers with the Right Skills Skills Anticipation in the Health Workforce: Skills Anticipation in the Health Workforce*. OECD Publishing.
- Irene, B., Opute, A., & Ibidunni, S. (2019). Competency-based entrepreneurship education: analysis of the disruptive innovation theory in African HEIs. *International Journal of Business and Globalisation*, In-press.
- Isenberg, D., & Onyemah, V. (2016). Fostering scale up ecosystems for regional economic growth. In *Global Entrepreneurship Congress* (pp. 71–97). Tagore LLC.
- Jowi, J. O. (2024). Recent developments in higher education in Africa: partnerships for knowledge transformations. *Journal of International Cooperation in Education*, 26(1), 34–48. <https://doi.org/10.1108/JICE-11-2023-0037>
- Kayyali, M. (2023). Promoting Entrepreneurship and Innovation in Higher Education. *Online Submission*, 2(1), 1–26.
- Kesten, A. (2019). Analysis of the missions of higher education institutions within the scope of third mission understanding. *International Journal of Educational Methodology*, 5(3), 387–400. <https://doi.org/10.12973/ijem.5.3.387>
- Kgari, K. (2018). The role of the Technology Innovation Agency in promoting innovation and entrepreneurship in South Africa. *Journal of Entrepreneurship in Africa*, 9(1), 1–12

- Kolade, O., Osabuohien, E., Aremu, A., Olanipekun, K. A., Osabohien, R., & Tunji-Olayeni, P. (2021). Co-creation of entrepreneurship education: challenges and opportunities for university, industry and public sector collaboration in Nigeria. In *The Palgrave Handbook of African Entrepreneurship* (pp. 239–265). https://doi.org/10.1007/978-3-030-75894-3_11
- Konstantinou, I., & Miller, E. (2020). Investigating work-integrated learning and its relevance to skills development in degree apprenticeships. *Higher Education, Skills and Work-Based Learning*, 10(5), 767–781. <https://doi.org/10.1108/HESWBL-05-2020-0112>
- Kruger, S., & Steyn, A. A. (2024). Developing breakthrough innovation capabilities in university ecosystems: A case study from South Africa. *Technological Forecasting and Social Change*, 198, 123002. <https://doi.org/10.1016/j.techfore.2023.123002>
- Kruse-Andersen, P. K. (2023). Testing R&D-Based Endogenous Growth Models. *Oxford Bulletin of Economics and Statistics*, 85(5), 1083–1110. <https://doi.org/10.1111/obes.12552>
- Kuh, G., & Gonyea, R. M. (2018). *Student engagement at liberal arts colleges*.
- Kurantini, N., & Osei-Hwedie, B. Z. (2021). Knowledge-Based Economy: Enhancing Economic Growth and Development of Human Capital through Information and Communications Technology Education. In *Comparative Advantage in the Knowledge Economy* (pp. 1–10). Emerald Publishing Limited. <https://doi.org/10.1108/978-1-80071-040-520210001>
- Lee, S. (2018). The Benefits of Collaboration between Academia and Industry. *Journal of Technology Transfer*, 43(3), 537–548.
- Li, L. (2020). Education supply chain in the era of Industry 4.0. *Systems Research and Behavioral Science*, 37(4), 579–592. <https://doi.org/10.1002/sres.2702>
- Lis, M. (2021). Higher education institutions as partners in growing innovation of local economy. *Social Sciences*, 10(8), 316. <https://doi.org/10.3390/socsci10080316>
- Lubbe, I., & Svensson, G. (2022). Work Integrated Learning (WIL) model-A win-win process between university, postgraduate business students and industry. *The Independent Journal of Teaching and Learning*, 17(1), 39–59.
- Mabula, D. I. C. (2022). *Implementing the new partnership for Africa's development (NEPAD): challenges and prospects*. Doctoral dissertation, North-West University (South Africa).
- Mandela, N. (2024). *PML Daily, 90% TVET graduates more skillful than their University counterparts, get jobs fast – Report*. Retrieved from <https://www.pmldaily.com/news/education/2024/05/90-tvet-graduates-more-skillful-than-their-university-counterparts-get-jobs-fast-report.html>
- Maravalle, A., & Pandiella, A. G. (2023). *Improving the quality and efficiency of education and training in Costa Rica to better support growth and equity*. <https://doi.org/10.1787/8d6e7009-en>
- Mbithi, P. M., Mbau, J. S., Muthama, N. J., Inyega, H., & Kalai, J. M. (2021). Higher education and skills development in Africa: An analytical paper on the role of higher learning institutions on sustainable development. *Journal of Sustainability, Environment and Peace*, 4(2), 58–73. <https://doi.org/10.53537/jsep.2021.08.001>
- Mgonja, C. T. (2017). Enhancing the University - Industry Collaboration in Developing Countries through Best Practices. *International Journal of Engineering Trends and Technology*, 50(4), 216–225. <https://doi.org/10.14445/22315381/IJETT-V50P235>
- Miller, D. (2019). The resource-based view of the firm. In *Oxford Research Encyclopedia of Business and Management*. <https://doi.org/10.1093/acrefore/9780190224851.013.4>
- Mlambo, V. H., Thusi, X., & Ndlovuand, S. G. (2022). The African Union's Agenda 2063 for Africa's Development: Possibility or ruse? *Prizren Social Science Journal*, 6(3), 64–74. <https://doi.org/10.32936/pssj.v6i3.358>
- Moni, B. (2021). *Work-integrated learning and graduate employment: a case study of a university of technology in the Western Cape*. Doctoral dissertation, Cape Peninsula University of Technology.
- Moodie, G. (2016). *Universities, disruptive technologies, and continuity in higher education: The impact of information revolutions*. Springer. <https://doi.org/10.1057/978-1-137-54943-3>
- Moshtari, M., & Safarpour, A. (2024). Challenges and strategies for the internationalization of higher education

- in low-income East African countries. *Higher Education*, 87(1), 89–109. <https://doi.org/10.1007/s10734-023-00994-1>
- Mouton, N., & Goosen, G. (2017). The role of the Technology Innovation Agency in stimulating innovation in South Africa. *South African Journal of Science*, 113(1), 1–7.
- Mseleku, Z. (2022). Youth high unemployment/unemployability in South Africa: the unemployed graduates' perspectives. *Higher Education, Skills and Work-Based Learning*, 12(4), 775–790. <https://doi.org/10.1108/HESWBL-06-2021-0114>
- Mugimu, C. B. (2021). Higher Education Institutions (HEIs) in Africa embracing the “new normal” for knowledge production and innovation: Barriers, realities, and possibilities. In *Higher Education-New Approaches to Accreditation, Digitalization, and Globalization in the Age of Covid*. IntechOpen.
- Muir, T., Halesby-Roitman Jr., J., & Ruffin-Brown Jr., T. W. (2018). *Online education: An overview*.
- Mwabu, G. M. (2019). The state of higher education in Africa: Challenges and opportunities. *Journal of Higher Education Policy and Management*, 41(1), 21–34.
- National Center for Education Statistics. (2020). *Degrees conferred by postsecondary institutions*. Retrieved from <https://www.infodocket.com/2020/10/14/national-center-for-education-statistics-nces-releases-new-data-on-postsecondary-graduation-rates-outcome-measures-student-financial-aid-and-admissions/>
- National League for Nursing. (2020). *Facts about nursing education*. Retrieved from <https://elsevierfoundation.org/wp-content/uploads/2020/09/NLN-Program-Overview-1.pdf>
- Nkosi, T. L. (2022). *Harnessing the Fourth Industrial Revolution for improved educational infrastructure in South African Higher Education Institutions*. Doctoral dissertation, University of Johannesburg.
- Nwaiwu, J. N. (2024). Indirect Tax and Economic Growth in Nigeria: Endogenous Growth Theory and Neo-Classical Growth Theory. *GPH-International Journal of Social Science and Humanities Research*, 7(02), 34–51.
- Nwokolo, S. C., Eyime, E. E., Obiwulu, A. U., & Ogbulezie, J. C. (2023). Africa's Path to Sustainability: Harnessing Technology, Policy, and Collaboration. *Trends in Renewable Energy*, 10(1), 98–131. <https://doi.org/10.17737/tre.2024.10.1.00166>
- O'Dwyer, M., Filieri, R., & O'Malley, L. (2023). Establishing successful university–industry collaborations: barriers and enablers deconstructed. *The Journal of Technology Transfer*, 48(3), 900–931. <https://doi.org/10.1007/s10961-022-09932-2>
- Olo, D., Correia, L., & Rego, C. (2021). Higher education institutions and development: Missions, models, and challenges. *Journal of Social Studies Education Research*, 12(2), 1–25. <https://doi.org/10.4018/978-1-7998-0174-0.ch001>
- Olumide, T. A., & Bamidele, O. S. (2018). The Role of University-Industry Collaboration in Promoting Technological Innovation in Nigeria. *Journal of Science and Technology Policy*, 9(2), 15–24.
- O'Neill, T., Hartigan, K., & Spillane, J. P. (2024). Factors Inhibiting Higher Education Institutions from addressing Industry driven change in Irish Construction Management Programs. *International Journal of Construction Education and Research*, 20(1), 65–82. <https://doi.org/10.1080/15578771.2023.2181471>
- Ongiti, O. (2024). Dilemma of African Higher Education Global Partnership on MDGS and SDGs. *African Journal of Education and Practice*, 10(1), 1–13. <https://doi.org/10.47604/ajep.2246>
- Osuji, C. U., & Emmanuel-Ichenwo, D. (2024). Influence of Institutional Factors on the Management of Open and Distance Learning Programmes in Public Universities in Rivers State. *African Journal of Information, Economics and Management Research*, 2(1).
- Patricio, R., Moreira, A., Zurlo, F., & Melazzini, M. (2020). Co-creation of new solutions through gamification: A collaborative innovation practice. *Creativity and Innovation Management*, 29(1), 146–160. <https://doi.org/10.1111/caim.12356>
- Păvăloaia, V. D., & Necula, S. C. (2023). Artificial intelligence as a disruptive technology—a systematic literature review. *Electronics*, 12(5), 1102. <https://doi.org/10.3390/electronics12051102>
- Pee, S., & Vululleh, N. (2020). Role of universities in transforming society: Challenges and practices. *International Perspectives on Policies, Practices & Pedagogies for Promoting Social Responsibility in Higher Education*, 32(1), 67–79.

- Peter, C. (2021). Social innovation for sustainable urban developmental transitions in Sub-Saharan Africa: Leveraging economic ecosystems and the entrepreneurial state. *Sustainability*, *13*(13), 7360. <https://doi.org/10.3390/su13137360>
- Peters, B. G. (2022). *Institutional theory*. In *Handbook on theories of governance* (pp. 323–335). Edward Elgar Publishing. <https://doi.org/10.4337/9781800371972.00039>
- Phale, K., Li, F., Adjei Mensah, I., Omari-Sasu, A. Y., & Musah, M. (2021). Knowledge-based economy capacity building for developing countries: a panel analysis in Southern African Development Community. *Sustainability*, *13*(5), 2890. <https://doi.org/10.3390/su13052890>
- Popenoe, R., Langius-Eklöf, A., Stenwall, E., & Jervaeus, A. (2021). A practical guide to data analysis in general literature reviews. *Nordic Journal of Nursing Research*, *41*(4), 175–186. <https://doi.org/10.1177/2057158521991949>
- Porkodi, S., Saranya, R., Sultana, A., & Mittal, P. (2023). Assessing the impact of collaborative learning practices on competency development in entrepreneurship program: A study of higher education students in Delhi NCR region of India. *Journal of Information & Knowledge Management*, *22*(05), 2350021. <https://doi.org/10.1142/S0219649223500211>
- Qi, D., Ali, A., Li, T., Chen, Y. C., & Tan, J. (2022). An empirical analysis of the impact of higher education on economic growth: The case of China. *Frontiers in Psychology*, *13*. <https://doi.org/10.3389/fpsyg.2022.959026>
- Rafiana, N. N. (2024). Technopreneurship Strategy to Grow Entrepreneurship Career Options for Students in Higher Education. *ADI Journal on Recent Innovation*, *5*(2), 110–126. <https://doi.org/10.34306/ajri.v5i2.995>
- Ray, C., Nyberg, A. J., & Maltarich, M. A. (2023). Human capital resources emergence theory: The role of social capital. *Academy of Management Review*, *48*(2), 313–335. <https://doi.org/10.5465/amr.2020.0186>
- Rossoni, A. L., de Vasconcellos, E. P. G., & de Castilho Rossoni, R. L. (2023). Barriers and facilitators of university-industry collaboration for research, development and innovation: a systematic review. *Management Review Quarterly*, 1–37. <https://doi.org/10.1007/s11301-023-00349-1>
- Rossouw, D., & Goldman, G. A. (2023). Technology and collaboration as strategic drivers shaping higher education. *The Journal for Transdisciplinary Research in Southern Africa*, *19*(1), 1307. <https://doi.org/10.4102/td.v19i1.1307>
- Ruhrmann, H., Fritsch, M., & Leydesdorff, L. (2022). Synergy and policy-making in German innovation systems: Smart Specialisation Strategies at national, regional, local levels? *Regional Studies*, *56*(9), 1468–1479. <https://doi.org/10.1080/00343404.2021.1872780>
- Rybnicek, R., & Königsgruber, R. (2019). What makes industry–university collaboration succeed? A systematic review of the literature. *Journal of Business Economics*, *89*(2), 221–250. <https://doi.org/10.1007/s11573-018-0916-6>
- Sairmaly, F. A. (2023). Human Capital Development and Economic Growth: A Literature Review on Information Technology Investment, Education, Skills, and Productive Labour. *Journal Minfo Polgan*, *12*(1), 679–693. <https://doi.org/10.33395/jmp.v12i1.12491>
- Saravanakumar, A. R., & Ponniah, K. (2023). Towards innovation and excellence: transforming higher education in Tamil Nadu. *Annamalai International Journal of Business Studies & Research*, *14*(2).
- Schumpeter, J. A., & Swedberg, R. (2021). *The theory of economic development*. Routledge. <https://doi.org/10.4324/9781003146766>
- Shauri, H., Mwakumanya, M., & Lusweti, S. (2024). Education for Sustainable Development in Kenya. In *World Review* (pp. 4–21). CRC Press
- Sjöö, K., & Hellström, T. (2019). University–industry collaboration: A literature review and synthesis. *Industry and Higher Education*, *33*(4), 275–285. <https://doi.org/10.1177/0950422219829697>
- Smolentseva, A. (2023). Contributions of higher education to society: towards conceptualisation. In *Assessing the Contributions of Higher Education* (pp. 38–60). Edward Elgar Publishing. <https://doi.org/10.4337/9781035307173.00011>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>

- Sobri, A. Y., Voak, A., Fairman, B., & Wonorahardjo, S. (2023). Engaging with industry through internships in order to acquire the skills, knowledge and attitudes for the world of work: The Indonesian student experience. *Journal of Higher Education Theory and Practice*, 23(9). <https://doi.org/10.33423/jhetp.v23i9.6125>
- South African Government. (2019). *Department of Science and Technology: Annual Performance Plan 2019/2020*. Retrieved from <https://www.dst.gov.za/documents/2019/02/DST-Annual-Performance-Plan-2019-2020.pdf>
- Sun, J., Turner, H. (2023). The Complementarity Investment in University-Industry Collaboration. *Innov High Educ.*, 48, 539–556. <https://doi.org/10.1007/s10755-022-09641-6>
- Teixeira, A. F., Gonçalves, M. J. A., & Taylor, M. D. L. M. (2021). How higher education institutions are driving to digital transformation: A case study. *Education Sciences*, 11(10), 636. <https://doi.org/10.3390/educsci11100636>
- Tholen, G. (2022). Policymaking in higher education: human capital. In *Modern Work and the Marketisation of Higher Education* (pp. 55–69). Policy Press. <https://doi.org/10.2307/j.ctv2vzdgmf.8>
- Todaro, M. P., & Smith, S. C. (2020). *Economic development*. Pearson UK.
- Torrance, H. (2020). The research excellence framework in the United Kingdom: Processes, consequences, and incentives to engage. *Qualitative Inquiry*, 26(7), 771–779. <https://doi.org/10.1177/1077800419878748>
- Tseng, F. C., Huang, M. H., & Chen, D. Z. (2020). Factors of university–industry collaboration affecting university innovation performance. *The Journal of Technology Transfer*, 45, 560–577. <https://doi.org/10.1007/s10961-018-9656-6>
- Ufomba, H. U. (2020). The African Union development agenda 2063: Can Africa get it right? *Brazilian Journal of Development*, 6(8), 62626–62648. <https://doi.org/10.34117/bjdv6n8-627>
- University of California, Berkeley. (2020). *Tesla and University of California, Berkeley partner to develop new electric vehicle technologies*. Retrieved from <https://news.berkeley.edu/2020/02/12/tesla-and-university-of-california-berkeley-partner-to-develop-new-electric-vehicle-technologies/>
- Villanueva, D. (2023). Toward a general neoclassical theory of economic growth. *Philippine Review of Economics* (Online ISSN 2984-8156), 60(2), 64–80. <https://doi.org/10.37907/4ERP3202D>
- Vlk, A. (2023). The role of industry in higher education transformation. In *Research Handbook on the Transformation of Higher Education* (pp. 192–206). Edward Elgar Publishing. <https://doi.org/10.4337/9781800378216.00020>
- Wang, X., Chen, Y., & Zhang, J. (2019). A Study on the Collaboration between Academia and Industry: A Case Study of Stanford University and Google. *Journal of Industrial Technology and Management*, 10(2), 1–12.
- Whitehead, J., & Huxtable, M. (2023). Why a focus on ‘what is educational?’ matters so much in reconstructing education? *Irish Educational Studies*, 1–16. <https://doi.org/10.1080/03323315.2023.2251451>
- Winterton, J., & Cafferkey, K. (2019). Revisiting human capital theory: Progress and prospects. In *Elgar introduction to theories of human resources and employment relations* (pp. 218–234). <https://doi.org/10.4337/9781786439017.00023>
- Zavale, N. C. (2018). Expansion versus contribution of higher education in Africa: University–industry linkages in Mozambique from companies’ perspective. *Science and Public Policy*, 45(5), 645–660. <https://doi.org/10.1093/scipol/scx089>
- Zhuang, T., Zhou, H., & Sun, Q. (2024). Ushering in industrial forces for teaching-focused university-industry collaboration in China: a resource-dependence perspective. *Studies in Higher Education*, 1–19. <https://doi.org/10.1080/03075079.2024.2306343>
- Zhuang, T., & Zhou, H. (2023). Developing a synergistic approach to engineering education: China’s national policies on university–industry educational collaboration. *Asia Pacific Education Review*, 24(1), 145–165. <https://doi.org/10.1007/s12564-022-09743-y>

Copyrights

Copyright for this article is retained by the author, with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).