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Towards Effective Academia-Industry Collaborations: The Case of Higher Learning Institutions in Tanzania

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ABSTRACT

Industries are the main consumers of products from higher learning institutions (HLIs); graduates for employment and research outputs for socio-economic development. Research outputs from HLIs are commercialized as services or products facilitated by academia-industry collaborations. The collaborations are expected to address mismatch between labour market needs and HLIs' products, which has resulted in graduates' employability challenges. Despite their importance, effective academia-industry collaborations remain challenging. This study explores the effectiveness of Academia-Industry collaborations established by HLIs in implementing the Higher Education Economic Transformation (HEET) project (2021-2026) in Tanzania. One of the project objectives is to build functional linkages between industry and HLIs to align graduates with needs of labour market. The study explored the quantity and types of collaborations established, enablers and barriers, strategies to align graduates with market needs, and sustainability. Using a mixed-method approach, data was collected from eighteen out of nineteen participating institutions through an open-ended questionnaire. By June 2024, HLIs had established 2 to 23 collaborations, with joint research being the most common type of collaboration. Key enablers were institutional support and mutual benefit. Funding constraints and bureaucratic delays were the common barriers. Strategies for aligning HLIs outputs with market needs included enhancing practical skills for both staff and students, curriculum reviews, and institutionalizing the collaboration. Engagement, formal agreements and regular reviews were the strategies for collaboration sustainability. The study results serve as useful feedback to the HLIs, industries, and inputs to policymakers in facilitating effective academia-industry collaborations.

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INTRODUCTION

Developing countries especially those with middle income status have a capability of economic growth due to a potential need for investing in various economic sectors such as manufacturing and services. This suggests a need for synchronization of the knowledge and skills generation with the requirement of the industry to sustain

country's economic growth inculcated with more inclusive opportunities for improved living standards of the people.

Literature suggests that the labour market is not satisfied with the quantity and quality of labour forces in most of the developing countries. For instance, it has been reported that the economic sector in the eastern African countries is hindered due to limited availability of labour force with relevant skills (National Bureau for Statistics, 2014). Consequently, the economy suffers reduced productivity, increased operational costs, missed opportunities for growth and increased unemployment rates. To address these challenges, the Tanzanian government has engaged into a five-year (2021-2026) Higher Education for Economic Transformation (HEET) Project. The aim of the HEET project it the strengthen the learning environment and labour market alignment of the university graduates in the country. Among the initiatives under the transformation include strengthening the linkage between the higher learning institutions and the industry (The World Bank, 2021 Higher Education for Economic Transformation Project, 2021). Through the initiative, public universities have set out and implementing activities which aim at building an effective functional linkage with the industry in order to improve the quality of graduates and enhance research, innovation and economic growth.

Academia-industry collaborations (AIC), often referred to as partnerships or bi-directional linkages between higher learning institutions and commercial entities, have gained significant attention as a means to bridge the gap between theoretical knowledge generated in academic settings and its practical application in industry (Passos et al., 2023; Feller et al., 2018). Academia-industry collaborations have become a fundamental aspect of the knowledge economy, fostering innovation, enhancing educational outcomes, and preparing students for the demands of the job market (Nyemba et al., 2021; Tran, 2016; Al-Ashaab et al., 2011). The implementation of AIC is on a win-win basis between the higher learning institution and the industry partner. In this arrangement, the industry offers real challenges which require solutions, opportunities for strengthening curricula of the university and getting reliable source of data. Similarly, the universities offer high-quality knowledge, research and innovation opportunities and alignment of the workforce with the requirements of the industry. This arrangement has potential benefits to macro-economy of the country though creation of new start-ups and enhanced employability of graduates. The AIC initiates and promotes knowledge transfer, collaborative research and facilitates development of innovative solutions to real challenges within the economic settings.

For the AICs to exists and deliver the expected output, it is necessary to have a clear system to support its inception, propagation and existence. The system should ensure a supportive environment which encourages sharing of goals and expectations against which the transformation can be made. Consequently, AICs exist in deferent modes that lead into either high, medium or low interactions (Guimon, 2013). Similarly, the AICs formation exists into different phases (Ankrah and Al-Taaba, 2015). The level with which the AICs are implemented depends on the level of development of the country and the support system provided in the particular country. These AICs interactions are reported to be stronger in developed countries than in developing countries (Nzanzumuhire and Groot, 2020). However, the need of IACs in developing countries is equally important due to the benefits of the interaction to both the universities and industry of those countries. The purpose of this study is to investigate effectiveness of initiatives for collaborations among the Higher Learning Institutions and industry in Tanzania since the inception of the HEET Project.

Overview of the origin and current status of academia-industry collaboration

The roots of academia-industry collaborations can be traced back to the early 20th century, with significant developments occurring during and after World War II. The wartime efforts emphasized the importance of scientific research and innovation for national defence, leading to increased government funding for research and development (R&D) and closer ties between universities and industries (Etzkowitz, 2008). The establishment of the Massachusetts Institute of Technology (MIT) as a model for research-driven education exemplifies the early adoption of such collaborations, emphasising the role of academic research in solving practical industrial problems (Rosenberg and Nelson, 1994).

The post-war period experienced the institutionalisation of academia-industry collaborations, driven by the Bayh-Dole Act of 1980 in the United States. This legislation allowed universities to retain intellectual property rights over inventions developed through federally funded research, thereby encouraging commercialization and technology transfer (Mowery et al., 2001). Similar policies were adopted globally, fostering a conducive environment for partnerships between academia and industry.

The rise of the knowledge economy further accelerated these collaborations, with industries increasingly relying on academic institutions for cutting-edge research and technological advancements (Perkmann et al., 2013). Universities began establishing technology transfer offices (TTOs) to facilitate patenting and licensing activities, and many introduced various programs dedicated to foster entrepreneurship and innovation (Geuna and Muscio, 2009). This is also termed the 'third mission' of universities, which extends beyond the universities' primary activities of teaching and performing research, it focuses on the "generation, use, application and exploitation of knowledge with external stakeholders and society in general" (Secundo et al., 2017; Wissema, 2009). This is geared toward positioning the relevance and socio-economic impact of universities, now universities are creating not only professionals but also scientists and entrepreneurs (Lukovics and Zuti, 2017; Wissema, 2009).

Currently, academia-industry collaborations are widespread and multifaceted, encompassing various forms of partnerships, including joint research projects, consultancy, internships, technology transfer, commercialization of intellectual property, curriculum development, and the establishment of research centres (Bastos et al., 2021; Ankrah and AL-Tabbaa, 2015; Guimón, 2013; D'Este and Patel, 2007). These collaborations have become a strategic priority for both academic institutions and industries, driven by the need for innovation, competitiveness, commercialization of research, enhancing graduate employability, and addressing complex societal challenges (Tran, 2016; Santoro and Betts, 2002).

However, the literature on AICs predominantly focuses on developed countries, while studies on developing regions, particularly Sub-Saharan Africa (SSA), remain relatively scarce (Nsanzumuhire and Groot, 2020; Freitas et al., 2013; Guimón, 2013; Lee and Lim 2001). SSA countries seem to suffer from a double neglect: they are under-researched but also ignored when research on them is produced. Although there are established best practices for AICs from industrialized countries of the global North, it is crucial to acknowledge the contextual disparities in less developed countries of the global South and adapt these practices accordingly (Kleiner-Schaefer and Schaefer, 2022; Outamha and Belhcen, 2020; Zavale and Macamo, 2016; Watkins et al., 2015; Ssebuwufu et al., 2012).

Types/Forms/ Modes/ Areas of AIC

There are different ways in which AICs are classified, for example from the perspective of the modes of collaboration such as Knowledge sharing and Materials transfer (O'Dwyer et al., 2022). The former mode of collaboration deals with sharing knowledge and technological expertise between the partners while the latter deals with transferring materials, technical infrastructure, and intellectual property rights. Other scholars have categorized the forms of AICs with varying degrees to which the partners are linked, whereby High intensity is illustrated by the developed Relationships, Medium and Low intensity are described by the Mobility and Transfer, respectively as shown in Table 1 with their mechanisms or channels of interactions (Guimón, 2013).

Table 1: A Typology of University-Industry Links, From Higher to Lower Intensity

High (Relationships)	Research partnerships	Inter-organizational arrangements for pursuing collaborative R&D, including research consortia and joint projects.
	Research services	Research-related activities commissioned to universities by industrial clients, including contract research, consulting, quality control, testing, certification, and prototype development.
	Shared infrastructure	Use of university labs and equipment by firms, business incubators, and technology parks located within universities.
Medium (Mobility)	Academic entrepreneurship	Development and commercial exploitation of technologies pursued by academic inventors through a company they (partly) own (spin-off companies).
	Human resource training and transfer	Training of industry employees, internship programs, postgraduate training in industry, secondments to industry of university faculty and research staff, adjunct faculty of industry participants.
Low (Transfer)	Commercialization of intellectual property	Transfer of university-generated IP (such as patents) to firms (e.g., via licensing).
	Scientific publications	Use of codified scientific knowledge within industry
	Informal interaction	Formation of social relationships (e.g., conferences, meetings, social networks)

Source: (Guimón, 2013).

On the other hand, several scholars have described the AICs from the process perspective by highlighting the phases of AICs, their interrelationships, the key activities entailed at each phase, the techniques, and tools to be used. These phases as demonstrated in Figure 1 commonly start from the embryonic or precondition or terrain mapping or pre-linkage phase (prior to Year 1); formation or initiation or establishment phase (Year 1-3); implementation or engagement or delivery or operational phase (Year 4-7); advancement or established or evaluation phase (Year 8 plus); till the latent and/or exit phase (Ahmed et al., 2022; O'Dwyer et al., 2022; Ankrah and Al-Taaba, 2015; Plewa et al., 2013a; Philbin, 2008).

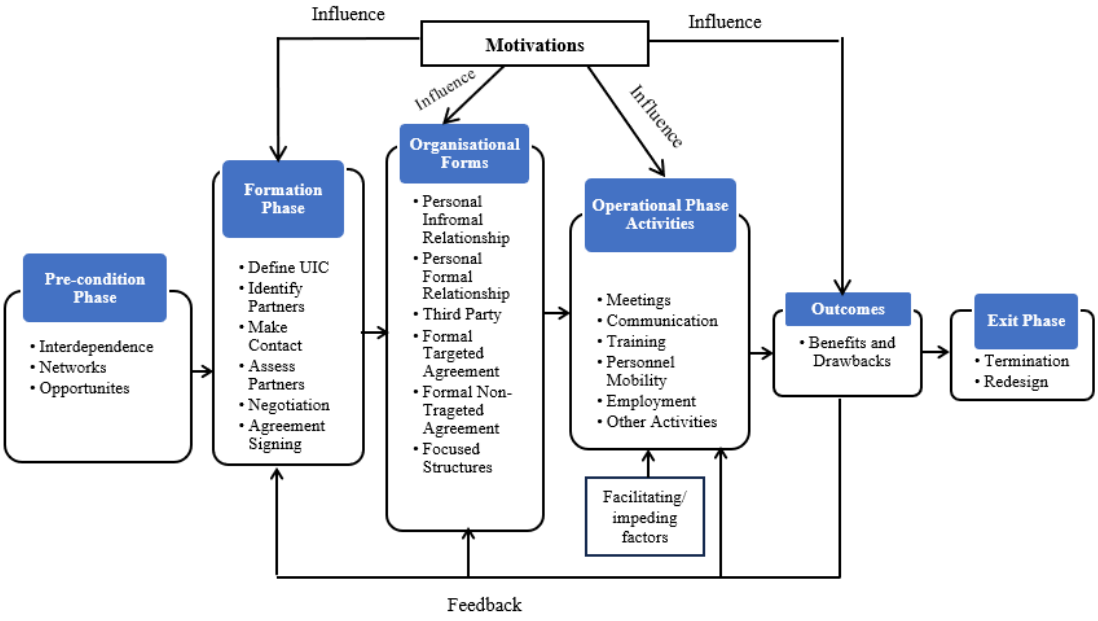

Figure 1: Conceptual Process Framework for UIC: An Integrative View

Source: Adapted from Ankrah and Al-Taaba, 2015

Moreover, the models and frameworks used to describe the AIC have mainly been grounded under several theories including the social exchange theory, triple helix, and quadruple helix concept, innovation systems theory, knowledge-based view theory, resource-based view theory, social network theory, social capital theory, theory of change, organisational learning and institutional theory (Hailu, 2024; Figueiredo and Ferreira, 2022; Mazet and Havenvid, 2020; Ankrah and Al-Taaba, 2016).

Factors influencing AIC (Enablers of AIC)

Several enablers drive the success of academia-industry collaborations, including prior collaboration experience, prior experience in making network connections, funding network experience, clear communication, defined roles and responsibilities, mutual trust and respect, a shared vision, government or external agencies funding, IP agreement, Project manager/ TTO and Industrial Liaison Offices, dedicated collaboration platforms, government policies promoting linkages, presence of academic and/or professional staff with entrepreneurial experience, explicit promotion of linkages in the strategic plan, annual plan or other institutional priorities, senior leadership positions devoted to promoting linkages, private sector-demand, existence of a central office to provide support and coordination of linkages, cross-cultural skills, interfaces towards key resources, a preparedness for continuous change (Rossoni et al., 2024; O'Dwyer et al., 2022; Ssebuwufu et al., 2022; Perkmann et al., 2013; Ranga and Etzkowitz, 2013; Runeson, 2012; Plewa et al., 2013b; Philbin, 2010).

On the other hand, Rybnicek and Königsgruber (2018) derived four distinct, overarching categories of the success AIC factors to include institutional factors (e.g. resources, structure, willingness to change); relationship factors (e.g. communication, commitment, trust, role of leadership); output factors (e.g. objectives, knowledge and technology transfer), and framework factors (e.g. environment, contracts and IPRs, geographical distance).

Other scholar categorised the AIC facilitating factors in terms of contextual factors, process factors, social factors, knowledge factors, organizational factors, university climate readiness (e.g. incentive system), firm climate readiness (e.g. managers' attitude toward academic research), and exchange readiness (e.g. a firm's absorptive capacity) (Ramli, 2013; Philbin, 2008).

Barriers of AIC

Despite the potential benefits, academia-industry collaborations face significant challenges. These include differing priorities and timelines between academia and industry, trust and intellectual property concerns, and challenges in aligning organizational cultures (O'Dwyer et al., 2022; Phan et al., 2016). Moreover, bureaucratic hurdles within academic institutions and the competitive nature of industrial sectors can hinder effective collaboration (Fernandez et al., 2020; Mihyo, 2013). Others include: informational and cultural barriers between universities and firms, insufficient rewards for faculty involvement in university technology transfer, bureaucracy and the inflexibility of university administrators, insufficient resources, university institutional rigidity, fragmented organization, lack of mutual trust between firms and universities, inadequate research infrastructure (e.g. laboratories and equipment) and lack of entrepreneurial skills and knowledge among academic staff. In addition to that, there are also low numbers of qualified faculty, brain drain, ageing faculty, and other issues associated with staff retention. Low enrolment in mathematics, engineering, and other science-related disciplines against large enrolments in social sciences and humanities are other contributing factors. Low degree of firms' absorptive capacity, absence or lack of effective intermediary organisations, and deficiencies in technology transfer offices are also barriers to AIC (Rossoni et al., 2024; Kleiner Schaefer and Schaefer, 2022; Ssebuwufu et al., 2022; Nsanzumuhire et al., 2021; Siegel et al., 2004; Edgar and Kharazmi, 2023).

Rybnicek and Königsgruber, (2018) hinted on the moderating these factors that influence or inhibits University Industry Collaboration (UIC), including scale of the partners or firm size, foreignes (e.g. large-scale company, SME, international company); organizational level (e.g. leadership, staff); activity sector; discipline (e.g. engineering, social science, economics); phase a collaboration process (e.g. formation, establishing, evaluation), and environmental readiness factors (e.g. unique socio-cultural setting in developing economies) (Kleiner Schaefer and Schaefer, 2022).

Sustainability of AICs

There is a need to know what both universities and industries gain from working together in order to enhance the sustainability of the collaborations. It should be a landscape where both sides give and take, finding ways to grow, continue, and reduce challenges together.

Among the strategies developed for AICs' sustainability include effective communication and relationship management; assistance in developing institutional strategic plans emphasizing AIC engagement; mutual benefits and value creation; strong governance and management structures; capacity building and knowledge transfer; assistance in training academic staff in entrepreneurship skills; support for establishing technology incubators and/or science parks; providing opportunities for peer learning from other institutions having a history of successful AIC engagement; policy interventions; tax incentives; fostering a supportive institutional environment; promoting a culture of collaboration among stakeholders, adopting fair royalty sharing structures and reward system, alumni network (Rossoni et al., 2024; Awashty et al., 2020; Fernandez et al., 2020; Phan et al., 2016; Guimón, 2013; Lee, 2000).

METHODS

The research adopted a mixed research method where both qualitative and quantitative research approaches have been used. The study used nineteen (19) Higher Learning Institutions as sample case studies. This sample was selected based on the fact that the nineteen HLIs are currently establishing collaboration/linkages with industry in implementation of the Higher Education for economic Transformation (HEET) Project. List of the HLIs used in this study are:

1. University of Dar es Salaam (UDSM)
2. Dar es Salaam University College of Education (DUCE)
3. Mkwawa University College of Education (MUCE)
4. Sokoine University of Agriculture (SUA)
5. Muhimbili University of Health and Allied Sciences (MUHAS)
6. University of Dodoma (UDOM)
7. Mzumbe University
8. Ardhi University (ARU)
9. State University of Zanzibar (SUZA)
10. Moshi Cooperative University (MoCU)
11. Nelson Mandela African Institution of Science and Technology (NMAIST)
12. Open University of Tanzania (OUT)
13. Mbeya University of Science and Technology (MUST)
14. Mwalimu Julius Nyerere University of Agriculture and Technology (MJNUAT)
15. Institute of Finance Management (IFM)
16. Institute of Accountancy Arusha(IAA)
17. Tanzania Institute of Accountancy (TIA)
18. Institute of Rural Development Planning(IRDP)
19. Eastern Africa Statistical Training Centre(EASTC)

Each HLI was examined through the following five questions in order to determine:

i. How many Academia – Industry Collaboration did they establish up to June, 2024?
ii. Types/areas of collaborations in each of the established linkages or collaborations.
iii. What were the enablers and barriers in establishing such collaborations?
iv. What strategies does the HLI put in place to address graduate alignment to needs of the labour market? hence graduate employability.
v. What strategies are developed for HLI-industry linkages sustainability?

Online Google form was used to develop a questionnaire for data collection. During data analysis, names of the participating HLIs were coded with the following String "Inst 1 to Inst 19". Quantitative data from questionnaire were further analysed by using the Microsoft excel, whereas for qualitative data, which are non-numerical and unstructured in form of text, as open-ended responses to survey questionnaires were analysed by using content analysis method. Content analysis is a qualitative data analysis method that systematically analyses qualitative data to identify specific features or patterns. It can further examine and quantify the presence of certain words, subjects, and concepts in qualitative text data. The method identifies the presence of specific features or patterns and can transform qualitative input into quantitative

data to help make reliable insight, hence informed conclusions.

The qualitative contents were first summarised to reduce duplication and hence create phrases that capture and group similar items from different HLIs responses. The created phrases were derived from collected contents to represent different types of collaborations, enablers and barriers to establish collaborations, strategies taken by HLIs to align their graduates with the needs of the labour market and strategies to sustain the established collaborations. Every phrase was supported by texts extracted from responses.

The contents were further quantitatively analysed to identify phrases frequencies of appearance in the data collected (contents). This way it was possible to identify the most common types of collaborations established, common enablers and barriers to establish collaborations, common strategies taken by HLIs to align their graduates with the needs of the labour market and common strategies for sustainability of the established collaborations.

RESULTS AND DISCUSSION

This section presents results obtained from the questionnaire for each question. The prepared questionnaire was sent to all nineteen HLIs implementing the HEET Project. Only eighteen (18) Institutions out of nineteen (19) responded.

Number of Collaborations Established

Table 2 shows data collected from eighteen institutions of how many University-Industry collaborations were established (i.e. how many Memorandum of Understanding (MoUs) or contracts each HLI had signed up to June, 2024. Summary of the collaboration established by HLIs up to June, 2024 is shown in Figure 2.

Table 2: Number of Collaboration Established (Mou Signed) up to June, 2024

S/N	Institution Code	Number of Collaboration Established (MoU Signed)
1.	Inst-1	10
2.	Inst-2	8
3.	Inst-3	7
4.	Inst-4	20
5.	Inst-5	8
6.	Inst-6	11
7.	Inst-7	10
8.	Inst-8	4
9.	Inst-9	22
10.	Inst-10	2
11.	Inst-11	12
12.	Inst-12	2
13.	Inst-13	12
14.	Inst-14	4
15.	Inst-15	10
16.	Inst-16	23
17.	Inst-17	12
18.	Inst-18	-
19.	Inst-19	10

Results showed that each of the HLIs surveyed strived to establish collaborations with Industry. The minimum number of collaborations established is two (2) and the maximum number is twenty-three (23). The number of collaborations established by eighteen HLIs with different industries in about one and a half year (Sept, 2022 to June, 2024) which is a relatively short period of time is evidence of the willingness from both industry and academia to work together. This demonstrates mutual interest and willingness from both academia and industry to strengthen collaborative ties.

Types of Collaborations Established

Responses by the 18 HLIs depict types of collaborations as shown in Table 3 together with supporting texts from the responses. Figure 3 shows types of collaborations and their frequency of appearances from the responded institutions. Joint research and publication, staff and students' placement

in industry, and capacity building appear to be the most common types of collaborations established.

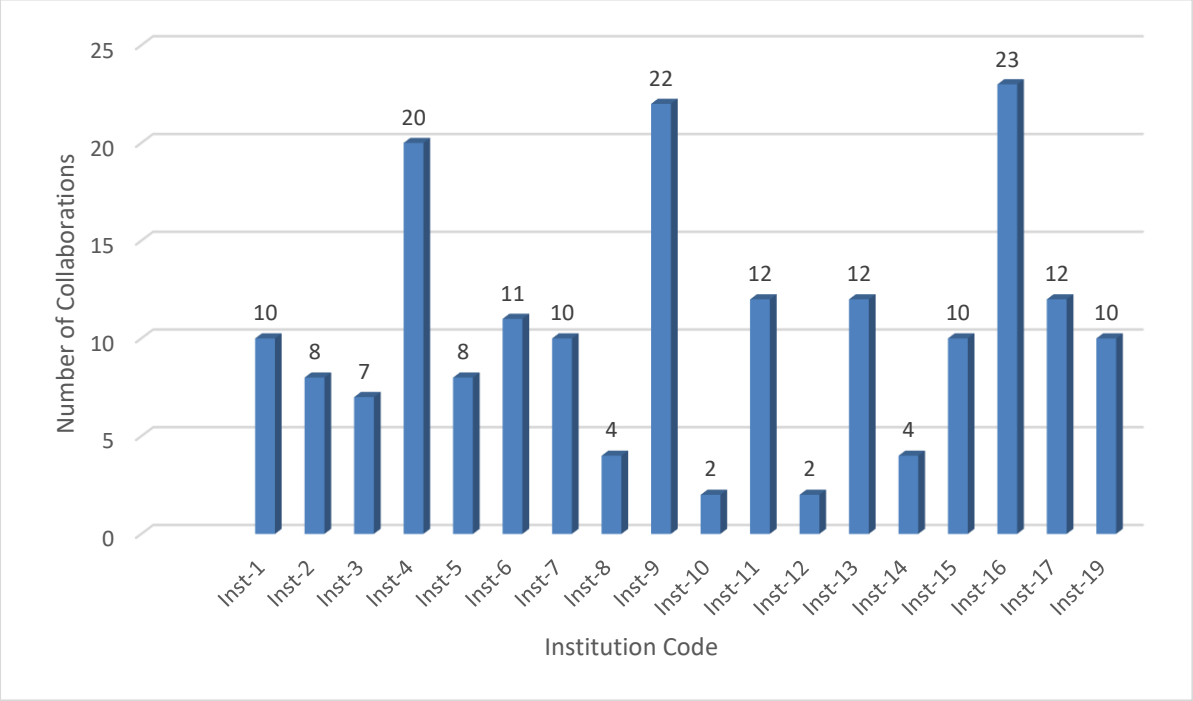

Figure 2: Summary of Collaborations Established up to June, 2024

Table 3: Types of Collaborations Established and Supporting Texts from Contents

S/N	Types of collaborations	Texts extracted form responses
1.	Joint Research and Publication	- "Joint research projects, conferences, workshops, short courses, symposia, seminars and training programs of mutual interest." - "Collaboration in research, knowledge exchange, staff and student placement, staff and student exchange, capacity building, research, students attachment, project, equipment, training, and paper writing."
2.	Staff and Student Placement/Exchange	- "Pursuit of avenues for exchange of researchers and scholars which may include staff, students, and postdoctoral scholars."
3.	Capacity Building	- "Ministry of Water, Energy, and Minerals - Zanzibar: Capacity building for women in the energy sector." - "Capacity building to students and staff." - "Developing and planning capacity development programs based on the needs." - "Staff and students' attachment in industry, Outreach programs, Joint research, Exchange information, Joint publication, Provide adjunct staff, Technical support and Capacity building, Internship and Graduate programs."
4.	Joint Projects and Resource Mobilization	- "Joint mobilization of resources and fundraising activities." - "Collaboration in areas of training, research, consultancy services, commercialization and technology transfer in Agriculture."

S/N	Types of collaborations	Texts extracted form responses
5.	Technical Support and Advisory Services	- "University of Medical Sciences and Technology (Khartoum): Training, research, and advisory services in the health sector." - "Collaboration with Ankara University, Republic of Turkey: Support for dental treatment equipment."
6.	Curricula Development	- "Collaboration in review and development of curricula which align with labour market needs." - "Curricula development in Tourism, Hospitality and Travel."
7.	Knowledge Exchange and Outreach Programs	- "Exchange and development of joint academic publications, research materials, and innovation." - "Association of Commonwealth Universities: Sharing experiences and exchanging experts."
8.	Conferences, Workshops, and Symposia	- "St. Augustine University of Tanzania (SAUT): Joint research, experience sharing, and organising seminars and conferences." - "Joint research projects, conferences, workshops, short courses, symposia, seminars and training programs of mutual interest."
9.	Innovation Hubs and Technology Transfer	- "Joint collaboration in establishing innovation hubs for incubation and technology transfer."
10.	Industry Collaboration and Guest Lectures	- "Collaboration with Kiira Motors for students' Industrial attachment, Public and Guest lectures, Innovation transfer, and capacity building." - "Guest speakers from the industry, Joint applied research activities, Sharing data and other information for research purposes."
11.	Memoranda of Understanding (MoUs) with Various Entities	- "MoU for students placements: Mwananyamala, Temeke, CCBRT Hospitals." - "MoU for joint research: Sapienza University."
12.	Information and Resource Sharing	- "Exchange of research materials, data, information, and knowledge between institutions." - "Inter-library exchange services."

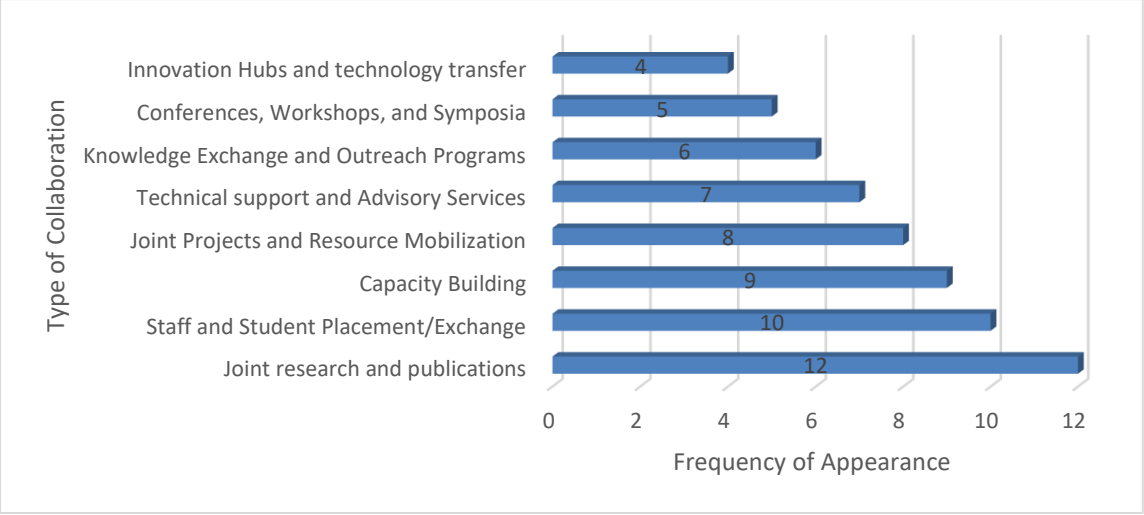

Figure 3: Types of Collaborations and Their Frequency of Appearances

Joint Research and Publication, Staff and Student Placement, and Capacity Building were the most frequently mentioned collaboration types, indicating a strong focus on knowledge exchange and workforce development. Additional partnerships involved Joint projects, Technical Support, Conferences, and Innovation Hubs, reflecting diverse areas of engagement. These partnerships are instrumental in aligning academic outputs with industry needs, enhancing both institutional impact and graduate employability.

Enablers in Establishing Collaborations

Table 4 shows enablers and texts supporting the enabler extracted from the responses and frequency of each enabler's appearance in the responses is shown in Figure 4.

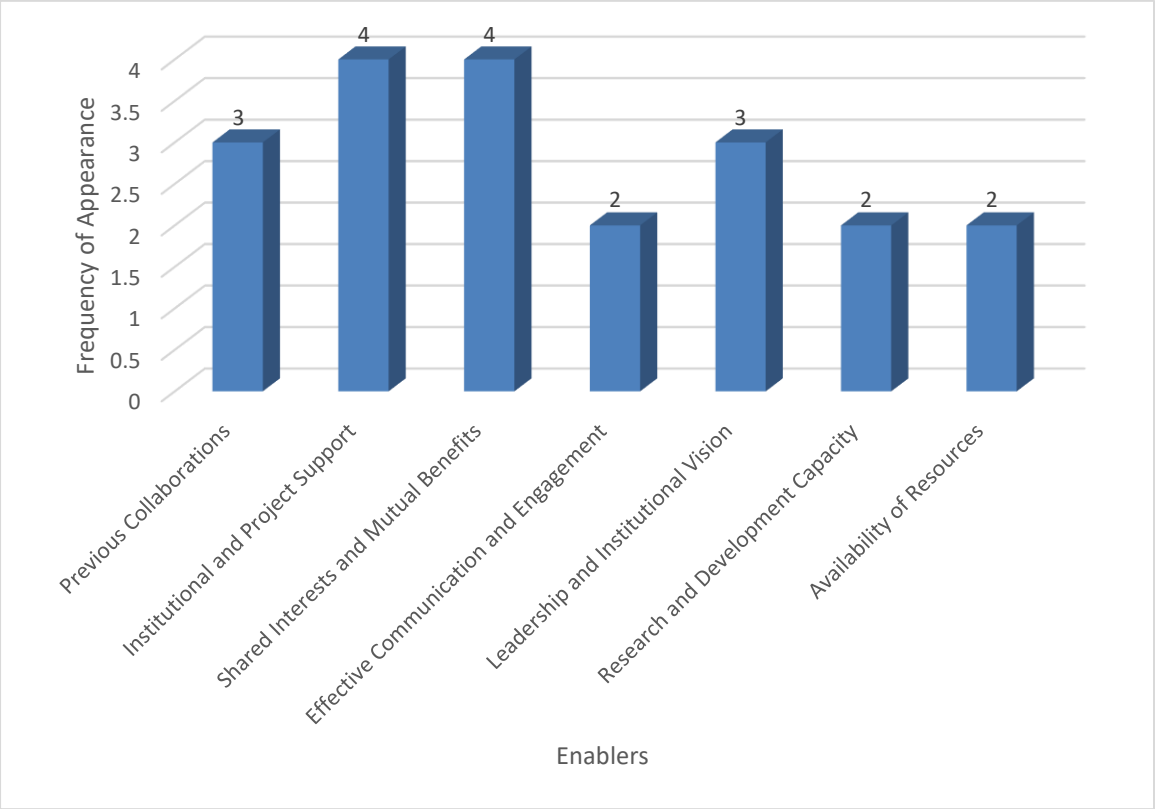

Figure 4: Frequency of Each Enabler's Appearance in the Responses

Table 4: Enablers and Supporting Texts Extracted from the Responses.

S/N	Enabler	Texts extracted form responses
1.	Previous Collaborations	"Previous existing collaboration paves the way to establish new ones." "Prior established relationships through seminars, workshops, training etc."
2.	Institutional and Project Support	"Support from HEET project in facilitating activities related to linkages with industry." "The support from HLI's Management, Legal Offices, and the management of public and private organisations."
3.	Shared Interests and Mutual Benefits	"Pre-existing collaborations, shared interests." "Mutual benefits for both parties."

S/N	Enabler	Texts extracted form responses
4.	Effective Communication and Engagement	"Effective communication and engagement with different organisations." "Visits to discuss and convince on collaborations."
5.	Leadership and Institutional Vision	"Willing leaders." "Strong Institutional Vision and Leadership."
6.	Research and Development Capacity	"The HLI expertise in relevant areas that are beneficial to stakeholders." "Capacity for Research and Development."
7.	Availability of Resources	"Availability of Funding and Resources." "Agreements and availability of technology and resources."

In case of enablers in the process of establishing collaborations, "Institutional and Project Support" and "Shared Interests and Mutual Benefits" were the most frequently mentioned enablers, highlighting the importance of aligned objectives and structured support mechanisms.

Other critical enablers were "Previous Collaborations" and "Leadership and Institutional Vision." Then "Effective Communication and Engagement", "Research and Development Capacity", and "Availability of Resources". Therefore, in order to build functional linkages with Industry HLIs are supposed to prioritise institutionalising activities related to collaborations with Industry in their day to day business processes.

Barriers in Establishing Collaborations

Table 5 lists barriers that impede the establishment of effective and timely collaborations between higher learning institutions and industry, along with texts extracted from responses that support the barrier. While number of times each barrier appears in the contents is shown in Figure 5:

Table 5 Lists of Barriers and Supporting Texts

S/N	Barrier	Supporting texts extracted form responses
1.	Funding Constraints	-"Financial barriers" - "Limited finance to facilitate the ceremonial signing of MoUs" - "Insufficient fund to make physical follow-ups" - "Insufficient fund to support administrative activities related to collaboration"
2.	Bureaucracy and Delays	- "Delay in responding, bureaucracy" - "VC office is being overwhelmed in ensuring number of MoU needed are signed and delivered to the required institution in time" - "The untimely acceptance of intention letter, drafting and signing process of the MoUs" - "Hierarchical nature of academia leads to taking longer for decision making related to collaboration with industry" - "Late approval of MOUs" - "Busy schedules of CEOs and it becomes difficult to get the MoU signed"
3.	Differences in Priorities and Objectives	- "Differing interests of the prospective partners" - "Misaligned objectives, and priorities from intended partners" - "Priority areas difference that lead to misunderstanding"

4.	Organisational and Cultural Differences	- "Different organisation culture between industry and academia" - "Differences in Academic Standards and industry Practices"
5.	Trust and Relationship Building	- "Low level of trust, inadequate resources and low understanding of the operation issues guide the industrial attachment" - "Lack of Trust from some of the private institutions" - "Mistrust by potential collaborators" - "Some partners are scared signing of MoUs thinking that they are strict commitments"
6.	Regulatory and Legal Challenges	- "Legal and Regulatory Challenges (complicated bureaucracy - especially when signing MoU with foreign Institution)"

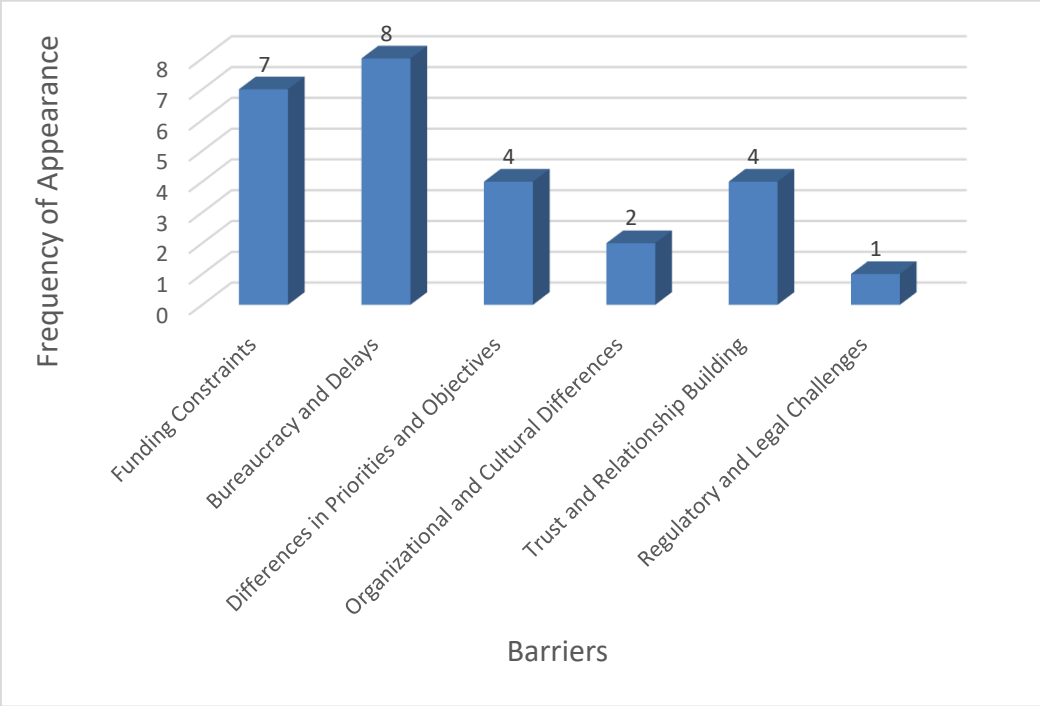

Figure 5: Number of Times Each Barrier appears in the Contents

Barriers that hinders establishment of collaborations between HLIs and industry are Bureaucracy and Delays, which is the most frequently mentioned barrier, appearing 8 times in the contents. Followed by Funding Constraints with 7 mentions. Differences in Priorities and Objectives and Trust and Relationship Building each appear 4 times**.** Organisational and Cultural Differences appear 2 times while Regulatory and Legal Challenges are mentioned only once. Therefore, Bureaucracy and Delays are the most common barriers to collaborations. Addressing these barriers requires streamlined processes, sufficient funding, and enhanced communication between academia and industry.

Strategies by HLI to address graduate alignment to needs of the labour market (hence graduate employability).

In order to align graduates with labour market needs, the following is a summary of key strategies that were mentioned by respondents. These strategies collectively aim to ensure that graduates are well-equipped with the skills and experiences needed to meet the demands of the labour market. Table 6 connects each strategy with specific texts from the respondent contents, illustrating how the strategies are supported in the content provided while Figure 6 shows frequency of each strategy's appearance in the collected contents.

Table 6: Strategies with Supporting Texts from the Provided Content

S/N	Strategy	Supporting texts extracted form responses
1.	Industry-Aligned Programs	"Our Institute introduced Apprenticeship Programs in Banking, Insurance and Risk Management, and Tourism and Hospitality Management that provides Industrial Skills and align needs of the labour market."
2.	Entrepreneurial Support	"Have Business startups that support students to become entrepreneurs and future employers."
3.	Practical Experience	"Developing effective university—industry partnerships for students' internships to gain appropriate required skills for the labour market." "Increased duration of field practical from four weeks to 15 weeks."
4.	Curriculum Development and Review	"Curriculum Review to reflect labour market." "The university is reviewing all curriculum and developing new curriculum to address the world labour market for health workforce with required skills."
5.	Guest Lectures and Public Engagement	"Inviting guest speakers from the industry to share their practical experiences with our students." "Implement advises from Industry Advisory Committees which are targeted to align graduates with needs of the labour market."
6.	Quality Assurance	"Strengthening quality assurance unit that oversees quality implementation of the university education."
7.	Alumni Networks and Career Services	"Keeping networking with alumni to connect job opportunities."
8.	Industry Advisory Committees	"Implement advises from Industry Advisory Committees which are targeted to align graduates with needs of the labor market."
9.	Memoranda of Understanding (MoUs)	"Develop and renew MoU, Industrial attachment, Curriculum Review and development, arrangements for conducting public lectures." "Engage the industry in the development and review of curricula."
10.	Specialized Programs	"Development of ICT Courses for students with disabilities...students with disabilities are being equipped with digital skills necessary for the labour market."

Practical Experience which is basically making sure that staff and students get access to improve their practical skills in industry, and Curriculum Development and Review to align with the dynamic development in the labour market were the most frequently mentioned strategies in which HLIs are putting in place to align their graduates with the changing need of the labour market.

Other effective strategies included Guest Lectures, Public Engagement and developing new and review Memoranda of Understanding (MoUs). Implementation of advice from Industry Advisory Committees (IACs) was also emphasized. While the rest

of the strategies such as Quality Assurance, Alumni Networks and Career Services had fewer mentions. All these strategies underscore the commitment of HLIs to producing skilled, market-ready graduates through closer industry integration.

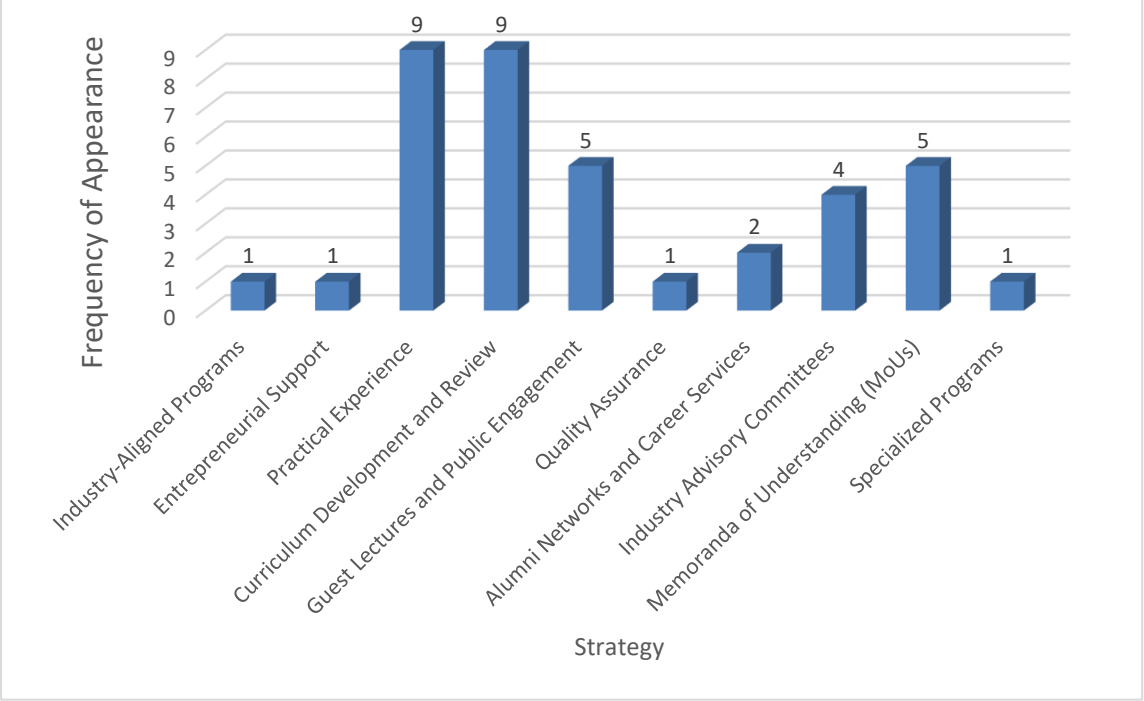

Figure 6: Frequency of Each Strategy's Appearance in the Collected Contents

Strategies for Sustainability of the Established Collaborations

To ensure sustainability of the established collaborations, several strategies have been implemented by the HLIs. These strategies are designed to create a sustainable and dynamic collaboration environment, ensuring long-term partnerships that are beneficial for both the university and its industry partners. Table 7 shows the strategies and corresponding texts from the respondent contents that support each strategy and Figure 6 shows strategies' frequency of appearance in the contents provided.

Table 7: Strategy and Respective Supporting Texts from Respondents

S/N	Strategy	Supporting texts extracted form responses
1.	Institutional Support and Structures	"Operation/activities of linkages with industry are institutionalized in the university business processes" - "A specific unit responsible for strengthening and maintaining linkages/collaborations with various stakeholders" - "Establishment of the ILO office, Putting the ILO office and the Industrial Advisory Committee in the university structure"
2.	Formal Agreements and Regular Reviews	- "Formalize the collaboration through MoUs or partnership agreements"

		- "Each MoU has requirement to formulate a joint committee to conduct regular assessments to evaluate the progress and impact of the collaboration" - "Regular review of MoUs" - "Periodic review agreements to reflect any changes in the scope or nature of the collaboration"
3.	Engagement and Capacity Building	- "Involving or invite our partners to participate events and activities conducted at our institute to bring them closer to our institute" - "Organize workshops, seminars, and training sessions to share knowledge and best practices"- "Facilitate applied research activities for HLI's staff to undertake them with our partner institutions" - "Engaging HLI's staff to interact with partners from the beginning"
4.	Resource Allocation and Support	- "Internal resources allocation to support the collaboration" - "Provide budgets for activities" - "Collaborating in writing proposals for securing funds to support the MoU objective"
5.	Mutual Benefits and Strategic Alignment	- "Establish mutual benefit (both partners) from MoU" - "Aligning of interests of HLI and organisations in MoUs created" - "To make sure that the two parties continue to enjoy the win-win situation throughout the lifetime of the MoU"
6.	Commitment and Adaptability	- "Ensure commitment from HLI's management to prioritize and support collaborative efforts" - "Be adaptable to changing circumstances and emerging opportunities" - "Encourage innovative approaches to problem-solving and project implementation"

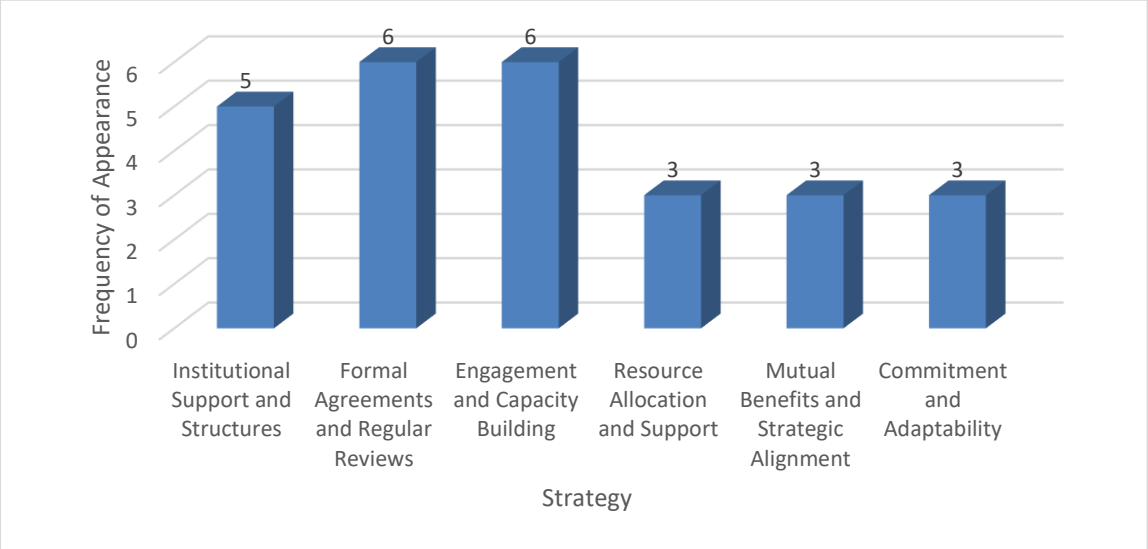

Figure 7: Strategies and Their Frequency of Appearance in the Contents Provided

The most prominent strategies were Formal Agreements and Regular Reviews, and Engagement and Capacity Building to sustain the established collaborations.

Institutionalizing collaboration through dedicated structures, such as Industry Liaison Offices (ILOs) and Industrial Advisory Committees, were also critical. Ensuring Resource Allocation, Mutual Benefits, and Adaptability further strengthened the sustainability of partnerships. These were the most common strategies identified by the HLIs to sustain the established collaborations. They also reflect the HLIs' proactive approach to maintaining and expanding collaborative networks, ensuring mutual growth and long-term relevance.

CONCLUSION AND RECOMMENDATIONS

This study managed to identify the number and different types of collaboration with Industry that have been established by the HLIs from September, 2022 up to June, 2024. Twenty-three (23) as the maximum number of Academia-Industry collaboration established is encouraging and shows the willingness of both parties for collaboration. Different enablers that facilitated and different barriers that hindered establishment of these collaborations were identified. The established collaborations are still in their infant stage, hence, it is not very clear whether the established collaboration will survive test of time and sustain the barriers that hindered their establishment even though the HLIs have listed different strategies to sustain the established collaborations. On the other hand, the HLIs have also listed a number of different strategies with the potential to align their graduates with the dynamic needs of the labour market. The HLIs are recommended to facilitate growth of the mentioned enablers which in turn supports collaborations with Industry for graduate employability together with its other multiple benefits such as staff professional development and access to state of the arts infrastructures in industry for both staff and students. The HLIs are further recommended to eliminate barriers that hindered establishment of collaboration or barriers that can affect survival of the established collaborations which are still in the infant stage. Results of this study can be used by both HLIs and Government entities, such as Ministries or Authorities responsible for Higher Learning Education in Tanzania to support establishment of functional linkages/collaborations with Industry in order to align HLIs' products to the labour market needs.

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