

Case Studies:
Invention Education at
Kenyatta University

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Value Proposition for the Innovation Ecosystem to Engage with Universities



Understanding Invention Education

The Invention Education (IvE) program enables students and faculty to improve healthcare by developing and delivering inventions that solve local and global challenges through international collaboration among universities, industries, hospitals, and non-profit organizations. Together with our collaborators in Malawi, Tanzania, Nigeria, Ethiopia, and the United States, Rice360 Institute for Global Health Technologies (Rice360) formed the Africa Invention Education Network to develop a scalable model for invention education that empowers innovators to address pressing local and global challenges.

In Kenya, there is a nationally-driven agenda to support pathways for innovation at the individual, institutional, and national levels. Rice360, in collaboration with Kenyatta University and with funding support from the Lemelson Foundation, expanded IvE in Kenya to enable universities to engage more actively in the national innovation ecosystem.

In this foundation-setting work, Rice360, in collaboration with stakeholders from universities and the broader innovation ecosystem, sought to:

- **Identify** invention education priorities with the highest value to impact the local innovation ecosystem.
- **Engage** with stakeholders in the innovation ecosystem beyond university settings (e.g., industries, innovation hubs, regulatory authorities, and funders) to understand their unique goals, needs, and opportunities with the highest value for engaging with universities in Kenya.
- **Convene** invention education and innovation ecosystem stakeholders to create and disseminate a plan of action that enables universities to engage in the Kenya innovation ecosystem.

In alignment with objective 2, In June 2023, Rice360 and Kenyatta University hosted the Innovators Forum in collaboration with Villgro Africa and the Coalition for Health Research and Development (CHReaD).

The Innovators Forum

The Innovators Forum, is a cross-sectoral (academia, government, and private sector) group created by Villgro Africa to facilitate and catalyze the realization of societal and economic value generated by a knowledge-driven economy in the health and life sciences sector through the translation of R&D into high growth ventures. The meeting convened eighteen stakeholders (**Figure 1**) in the Kenya innovation ecosystem with the goal of identifying the unique goals, needs, and opportunities for these partners to engage with universities through Rice360's Invention Education model in Kenya.

Innovators Forum Attendees							
Innovators	Innovator development support system	Governance system	Financial system	Standards information	Convenors	Industry	IP information
	     	 	 		   	 	 

Figure 1: The organizations which attended the innovator's forum.

At the outset of the meeting, TIBA-Vent was presented as an example of a university-led innovation (**Figure 2**). This activity aimed to define the role of the diverse stakeholders from the innovation ecosystem in the design, translation, and commercialization of university-led innovations. After that, the participants embarked on an activity to outline the strengths of collaborating with universities in Kenya and concluded by identifying the opportunities and challenges for invention education in Kenya.



Figure 2: From left - Dr. Kenneth Iloka (KU), Dr. June Madete (KU), and Dr. Robert (Villgro Africa) on a panel discussion regarding the TIBA-Vent project as a case study for a university-led innovation.

The three key value propositions for the innovation ecosystem to engage with academia through invention education were identified as providing access to a vibrant talent pool, offering access to existing innovation infrastructure, and unlocking access to public sector partnerships.



Figure 3: Three key value propositions for the innovation ecosystem to engage with academia through invention education.



Value proposition for the innovation ecosystem to engage with Universities in Kenya

Provide access to a vibrant talent pool: Access to quality talent and strategies for acquiring and retaining this talent is crucial to the sustainability of an innovation ecosystem. The attendees agreed that universities provide access to vibrant multidisciplinary talent pools that encompass both students and faculty. Some words and phrases used to describe university students include: creative, have a lot of fresh ideas, have the opportunity to experiment, and fail forward. On the other hand, faculty members were described as subject matter experts and technical mentors who have connections with top university talent, access to the university innovation infrastructure, and the experience and networks necessary to design and develop innovations.

Offer access to existing innovation infrastructure: Universities offer a wealth of resources and support, including research labs, design studios (such as one that Rice360 and Kenyatta University will set up at the institution in 2024) and mentorship programs, which are facilitated by faculty, providing a solid foundation for students and collaborators to access the necessary infrastructure for innovation. Additionally, universities maintain extensive databases of research materials, ensuring valuable resources are available for further exploration, a structured legal framework for innovation protection that safeguards intellectual property (IP) rights, grants which offer vital financial support for innovation, and scientific protocols such as ethical review boards that are crucial to the testing of innovative solutions.

Unlock access to public sector partnerships: In the dynamic landscape of MedTech development in Kenya, the strategic utilization of universities' extensive private and public sector networks emerged as a potent catalyst for collaboration. These networks encapsulate a multifaceted platform through which external stakeholders can tap into for connections between the public and private sectors. Partners in the innovation ecosystem highlighted the crucial role of government institutions in developing and delivering the policy, legal and regulatory frameworks that govern the development and translation of technology. However, barriers such as mistrust, misaligned culture, and incentives prevent effective engagement with the government. Partnerships between the innovation ecosystem stakeholders and universities were recommended to foster connections with the government. Universities have existing relationships with critical public and regulation research bodies such as the Kenya National Commission for Science, Technology & Innovation and Kenya Bureau of Standards (KBS), respectively. One of the business accelerators noted that all their efforts to facilitate engagement between their portfolio companies and KBS have been futile, while TIBA-Vent innovators reported immense support from the same institution. In the absence of standards to govern MedTech development in Kenya, KBS created new ones to support this university-led innovation.



Priorities and Challenges for Invention Education in Kenya

The participants outlined the priorities and challenges of engaging with talent in the university, engaging with established innovation infrastructure within the university and leveraging universities for public sector partnerships as follows:

Opportunities identified for the innovation ecosystem to engage with university talent included:

1. Access to the pipeline for their programs. Complimentary partnerships between universities and the innovation ecosystem on activities such as hackathons, design competitions, and other student competitions were proposed as great avenues for the discovery of new inventions. Thereafter, the stakeholders from the innovation ecosystem can provide enterprise development pathways through facilities such as incubators and venture studios to translate promising inventions into products that can sustainably solve local and global challenges. For credibility, it is important for university-based programs to incorporate the innovation ecosystem partners in funneling out the most promising inventions and only connect these ones to the innovation ecosystem partners to receive further support.
2. University-based programs such as IVE were identified as a great platform for identifying and developing high-quality entry-level talent. This is because such programs not only attract driven students but also have touch points with their initial employers. This presents a great feedback loop that could enhance their skills development program.
3. Leverage faculty's subject matter expertise to provide technical mentorship to innovators and offer specific short-term refresher training to their technical staff.

A few challenges identified in working with university talent included:

1. Most universities work within academic calendars that may misalign with the delivery timelines of partners in the innovation ecosystem. An attendee explained an instance where their manufacturing plant engaged engineering students to develop prototypes to address some of their technical challenges. Unfortunately, the time needed to finalize this engagement extended beyond the academic semester, and thus the students were unable to stay on board and finalize this project.
2. Universities lack comprehensive Intellectually Property and commercialization policies to enable collaboration between partners from the innovation ecosystem and faculty and student-innovators for the commercialization of inventions. One attendee reported how their effort to support a faculty member to commercialize his invention was halted as the institution lacked commercialization policies to govern the engagement with the faculty. For IP policies, one challenge identified was that the current IP ownership structures prioritize ownership of IP over shareholding in the resultant venture. The latter could be more valuable to the institution than the former. Consequently, some student-innovators have opted to wait until after graduation to develop their ideas outside of the university setting. Unfortunately, most partners outside of such institutions are not structured to provide support with the ideation of inventions.

3. Students-innovators have great novel ideas but lack the resilience needed to translate these into a business. Additionally, the transient connection with the university makes student-innovators risky clients for partners who are interested in the creation of value through long-term partnerships with the innovators. Some of the strategies proposed to address this challenge included: First, university-based programs such as the design studio should leverage existing venture-building models to help university-innovators curate a more experienced team, which through shareholding, could be incentivized to collaborate with the student -innovators to commercialize their ideas. Secondly, these programs can partner with postgraduate students who may have the right knowledge, experience, and motivation to develop and commercialize their innovations. Finally, the programs could incentivize the formation of joint ventures between student-innovators and more experienced faculty or business-oriented advisors to help close the skills and network gaps.
4. Faculty have limited bandwidth and incentives to build connections with partners in the innovation ecosystem. The core work of faculty is to teach students and publish research papers. The institution may not formally recognize efforts by faculty to support innovators within and outside the university if they do not align with this core mandate. Two strategies were proposed for closing these gaps: In the short term, it is important for the innovation ecosystem to consider ways to incentivize faculty to effectively support their programs. A few incentives identified were providing faculty with funds for mutually beneficial research and availing internship/ industrial attachment opportunities for their students. In the long term, through platforms like the Kenya Network of Entrepreneurial Institutions Leaders (KNEIL), the Kenya National Innovation Agency is working towards incorporating the design and translation of student and/or faculty inventions in the performance metrics of faculty in Kenya. Rice360/KU can continue to share knowledge with KNEIL by participating in its events to support its advocacy efforts.

Opportunities to foster engagement with the established innovation infrastructure within universities were proposed as follows:

1. Leverage programs at the institution that are bridging engagement between universities and the innovation ecosystem, such as the Chandaria Business Innovation and Incubation Centre at Kenyatta University, as entry points to access the university's innovation infrastructure.
2. Expand mutually beneficial partnerships to universities. For instance, a manufacturer can fund a student/ faculty innovator to leverage the university infrastructure to conduct actionable research on a topic of interest to the company. A few barriers that hinder this engagement include:
 - A public sector culture which includes bureaucracy, and a lack of focal points within the university to enhance effective collaboration with partners from the innovation ecosystem. To address this challenge, Universities should either enhance the capacity of the directorate that is charged with industry linkages or onboard a resource to serve as a focal point for facilitating engagement with the innovation ecosystem partners. The personnel serving this role should have exposure to both the public and private sectors to help bridge the cultural differences between universities and the innovation ecosystem. Additionally, the personnel should have visibility of other programs within the university to avoid duplication of existing efforts at the institution.
 - The presence of various departments, units, and administrative protocols within universities can complicate the process of identifying valuable resources to leverage for the innovation process. To mitigate this issue, universities should set up innovation spaces in neutral spaces intended to serve across departments and with external collaborators.
 - Mismanagement of resources, including grants and time, can discourage collaboration with partners from the innovation ecosystem. The proposed remedy was to leverage milestone-based grants to facilitate accountability. Additionally, require university partners to have “skin in the game” for them to demand accountability and excellence from the project teams.

Opportunities for leveraging universities for public-sector partnerships were identified as:

1. Universities can cultivate an environment where regulatory processes are navigated more easily. Their deep roots within the academic and research sectors have enabled them to form connections with governmental policy, legal and regulatory bodies.
2. The potency of universities' brand credibility represents another avenue of opportunity. The weight of a respected university's reputation can lend considerable persuasive power to partnership proposals, potentially hastening the development and adoption of healthcare technologies.
3. Engagement between the innovation ecosystem partners and governments gives rise to the triple helix model that can foster an ecosystem of heightened support for innovators.

Some of the challenges for leveraging universities for public sector partnerships are similar to those for leveraging the innovation ecosystem to access the innovation infrastructure present at the university. For instance, misalignment between private and public sector cultures. To address this challenge, it is important realistically estimate the amount of time that it would take to get a deliverable done in a public institution and plan this within the timeline of a given project. It is also important to identify personnel within the team that have successfully engaged with the stakeholders of interest and leverage them as champions to help navigate the new culture.



Conclusion and Lessons Learned

Following the convening, the following were identified as the critical success factors in bridging engagement between the innovation ecosystem and academia at the individual, institutional, and regional levels:

- 1. Individual Level:** At the core of this collaboration are the students and faculty who form the bedrock of the innovation ecosystem and academic engagement. The innovation ecosystem should identify spaces where students and faculty interested in engagement with the innovation ecosystem are located. Within the universities, such individuals are connected to programs that bridge engagement between the innovation ecosystem and academia, such as Rice360's design studios, Chandaria Business Incubation and Innovation Centre in KU, Young African Leaders Initiative (YALI) in KU, Higher Education Institution Unit at iHUB in Jomo Kenyatta University of Agriculture and Technology, Riara University and Nairobi University, the Consortium for Affordable Medical Technology (CAMTech) Uganda in Mbarara University.
- 2. Institutional Level:** Two priorities should be considered:
 - **People** - Identify faculty at the decision-making level who can serve as champions or advisory board members and leverage them to navigate the university system. In engaging with this faculty, it is crucial to ensure that the tasks at hand do not take him / her away from a faculty's core mandate but rather enable the faculty to successfully achieve it.
 - **Culture** - review the institution's strategic priorities and policies to assess if they align with the work that to be implemented at the institution. Evaluate the institution's experience with engaging with the innovation ecosystem. A few indicators of this experience include infrastructure such as labs, incubation spaces, research funds, and industrial parks that are supported by different partners from the innovation ecosystem.
- 3. National Level:** Engage with national platforms such as the Kenya National Innovation Agency to access the networks that can enable the innovation ecosystem actors to better engage with academia. These networks are crucial for peer learning, shaping of culture through highlighting of best practices, and advocating for the right institutional policies to strengthen engagement between the innovation ecosystem and academia.

Acknowledgements

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