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An innovation intermediary for Nairobi, Kenya: Designing student-centric services for university-industry collaboration

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Engaging students as partners in university-industry collaboration (UIC) through challenge-based and real-life projects creates significant value for all participants through novel educational approaches, talent recruitment, user-driven innovation, new resources, and research-related opportunities. However, as these practices have developed iteratively over time in industrialized countries and are highly context dependent, it is unclear how they can be best transferred to emerging economy contexts. In this paper, we present a research and design process of creating an innovation intermediary to foster student-centric UIC in Nairobi, Kenya. Seen as a set of services that reside on a multilevel platform, the intermediary aims to add value to the existing ecosystem through open access knowledge sharing, promoting partnerships, and mentoring for impact in an integrative, complementary way. Through a four-step qualitative research process involving interviews and co-creation workshops with local stakeholders, we examine the ecosystem, define value creation, design the services of the intermediary, and propose a step-wise model for further diffusion. We note the importance of establishing a solid rationale for collaboration, understanding the expected value to be created, creating a neutral space for the collaboration, and planning the implementation in detail. We contribute to transferring student-centric UIC practices into emerging economy contexts.

Keywords: innovation intermediaries, student-driven innovation, university-industry collaboration, service ecosystems, service platforms, service design

Introduction

This paper examines fostering university-industry collaboration (UIC) in Nairobi, Kenya, through the case of creating a student-centric innovation intermediary, understood as a knowledge-intensive service organization supporting value creation. Company visits, guest lectures, internships, and industry placements have traditionally supported students in transitioning to working life. Increasingly, novel student-centric and challenge-based learning processes and collaborative, reflexive, and problem-based learning practices have also been introduced. These engage entrepreneurially-minded students as active participants and full partners within UIC. For universities, this presents opportunities to generate and disseminate research, transmit learning, and access resources while engaging with industry. It is also seen to enhance student employability and enable industry to find and retain talent, tap into knowledge sources, and engage in user-driven innovation with the customers of tomorrow. Emerging from engineering, product development, and management contexts, student-centric UIC has been refined over the last decades through experimentation and cross-institutional collaboration. Initiatives are often framed as real-world challenge projects, addressing complex technical and social problems, aiming to co-create new products, services, and business. Typically, they do not have single, best solutions, requiring research, significant iteration, and development to create wide-ranging and meaningful concepts.

Student-centric UIC is seen to be beneficial within their contexts of origin (e.g. Banerjee and Ceri 2015) and within emerging global networks (DEMOLA 2020; Design Factory Global Network 2020; SUGAR Network 2020) that promote and diffuse these novel practices. These collaborations build on trust, motivation, and empowerment of participating students and are deeply embedded in local institutions, culture, and organizational arrangements. They are also history and path dependent, highly context specific, and have typically engaged with few participants (Banerjee and Gibbs 2016; Koria 2016; Marsan et al. 2016).

While student-centric UIC is seen to be beneficial and transferrable in the context of industrialized countries, it is less clear how to understand, localize, and set up appropriate and meaningful best practices in emerging economies. What would be the key areas in which value can be added within a local context? How could a service ecosystem related to UIC be set up? Furthermore, what would be principles to be applied in designing it?

In this paper, we examine the case of creating a student-centric UIC innovation intermediary in Nairobi, Kenya. The region has a well-developed entrepreneurial culture, a strong university sector, and an enabling environment for business. This study contributes to the overall aims of the Kenya Industry & Entrepreneurship Project (KIEP) (The World Bank Group 2020a), spanning the period 2018 till 2024. The initiative of the Government of Kenya, through its Ministry of Industry, Trade and

Cooperatives, supported by the World Bank Group (WBG) and the International Development Association (IDA), aims to help transform Kenya into a newly industrialized, globally competitive, middle-income country. Importance is placed on promoting firm-level innovation and the use of technology. The wider aim is to foster national and regional competitiveness (Cantwell 2005), entrepreneurship, economic participation, and growth (Acs et al. 2018) while educating future innovation leaders (Banerjee and Ceri 2015). The project builds on past initiatives (e.g. Nelson and Johnson 1997) for entrepreneurship education, developing further the entrepreneurial ecosystem in Kenya (Nafukho and Muyia 2010; Ndemo and Weiss 2016). The KIEP project highlights the role of the state in convening and promoting innovation intermediaries and UIC.

The overall context of the research and design process is presented in Figure 1. In the study, we apply a four-step process, building on Design Thinking (Brown and Wyatt 2010) and service design (Sangiorgi, Patrício, and Fisk 2017), within the Double Diamond process (Design Council 2015). We review the theoretical underpinnings of creating student-centric innovation intermediaries (De Silva, Howells, and Meyer 2018; Perkmann et al. 2013), building on service science and ecosystems (Akaka, Vargo, and Lusch 2013; Maglio et al. 2009; Vargo and Lusch 2014), platforms (Cusumano, Gawer, and Yoffie 2019) and service design (Sangiorgi, Patrício, and Fisk 2017). In the paper, we initially define the core theoretical construct of the student-centric ecosystem. Using the Double Diamond process and co-creation methods with stakeholders, we describe the process and content of establishing the expected value to be created by the UIC, together with the elements and the key desirable attributes of the service ecosystem. We then move to establish the desired set of services and the organization needed for the delivery. In the last section of the paper, we propose a generic model and a set of principles to enable diffusion of novel student-centric UIC practices aiming to contribute to the transfer of best practices to other contexts (Nafukho and Muyia 2010; Vallejo et al. 2019).

Literature review

From the early work on brokerage (Bessant and Rush 1995; Hargadon and Sutton 1997), the work on intermediary organizations has expanded to touch widely on the role of users, science and technology studies, innovation systems, and management (De Silva, Howells, and Meyer 2018; Howells 2006). Innovation intermediaries help to forge and sustain linkages between actors through capturing and diffusing knowledge and engaging, connecting, and supporting actors in value creation (De Silva, Howells, and Meyer 2018). As Stewart and Hyysalo (2008) note, learning happens through facilitating, configuring, and brokering activities; providing knowledge-intensive services can also be a source of innovation (Howells 2006). These intermediaries are important in UIC, facilitating engagement and commercialization (Perkmann et al. 2013) While much of the UIC takes place in dyadic relationships, complex multi-stakeholder collaborations are increasingly emerging within

ecosystems, often organized around sets of services (Spohrer et al. 2013) and platforms where users and producers meet and co-create value (Gawer and Cusumano 2014).

In the past, UIC has often had a focus on knowledge and technology transfer. Today, global competition, shorter product and service lifecycles, exponential growth in knowledge, shifting research and development (R&D) strategies, open innovation, and changes in university funding increasingly encourage deeper collaboration (Hagen 2002; Wright et al. 2008). Acting as a key source of innovation (Ankrah and Omar 2015) with a wide socio-economic remit, student-centric and challenge-based learning have changed the nature of UIC from the mid-'90s onwards (Banerjee and Gibbs 2016; Koria 2016; Unger et al. 2018). This has involved individual courses, such as the Mechanical Engineering 310 or non-degree studies at the d.school at Stanford, or degree programmes such as the International Design Business Management (IDBM) MSc at Aalto University or the Alta Scuola at Politécnico de Milano. Engaging students as lead innovators and users (Baldwin and Von Hippel 2011) has helped to shift the triple helix of innovation into a quadruple one (Carayannis and Campbell 2009). In this top-down and bottom-up ecosystem, students interact with government, universities, and enterprise to co-create value. This has impacted the motivations, processes, activities, and outcomes of UIC (Banerjee and Ceri 2015).

Universities engage in student-centric UIC to facilitate employment for their student body, create opportunities to apply knowledge, gain funding, influence, resources, and external exposure (Ankrah and Omar 2015; Perkmann et al. 2013). Firms seek talent, market knowledge, and complementary skills through the interaction. Together with knowledge spill-overs to enhance absorption capability, the aim is to complement R&D capability and gain access to current technology (Maurer and Valkenburg 2014; Perkmann et al. 2013). In turn, students are interested in real-world experience, employment, and entrepreneurial opportunity. It appears that the meeting points between governments, students, universities, and firms lie within local entrepreneurial ecosystems (Brown and Mawson 2019; Foster et al. 2013), with evident implications for the setup of student-centric innovation intermediaries. Collaboration is seen to drive UIC, enabling future business, wealth creation, and social innovation through spin-offs, startups, commercialization of knowledge, or creating novel methods of organizing and working with communities, social entrepreneurship, and society at large in multiple ways within entrepreneurial ecosystems.

Over time, business ecosystems (Iansiti and Levien 2004; Moore 1993) have evolved into innovation ecosystems (Adner 2006), knowledge-based ecosystems (Van der Borgh, Cloudt, and Romme 2012), and finally, entrepreneurial ecosystems (Foster et al. 2013; Graham 2014). These somewhat ambiguous systems (Stam 2015) involve political and legal sub-systems, national cultures, entrepreneurial mindsets and leadership, capital markets, digitalization, and new markets (Haley et al. 2016; Isenberg 2011; Miller 2012). They enable entrepreneurs,

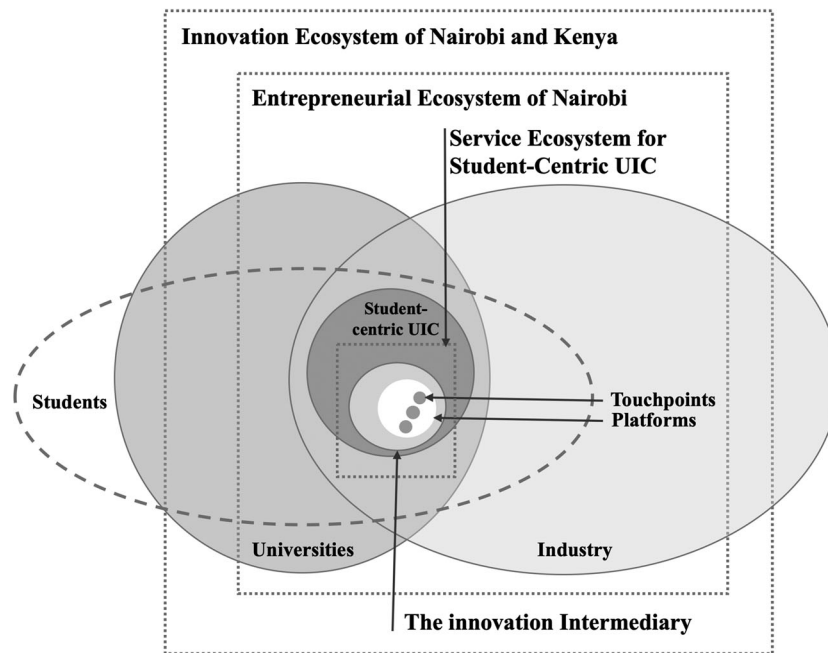


Figure 1: The context of the study.

businesses, social actors, students, and government to co-exist, co-evolve, and co-create in interdependent relationships through dynamic resource integration, triggering innovation (Lusch and Nambisan 2015). Within entrepreneurial ecosystems, student-centric innovation intermediaries organize their activities to support and enable knowledge flows, learning, and brokerage at the points of interactions (the touchpoints) with their producers and consumers within service ecosystems (Akaka, Vargo, and Lusch 2013; Maglio et al. 2009). Services are here understood as the basis of exchange and central source of value (Akaka, Koskela-Huotari, and Vargo 2019; Lusch and Nambisan 2015), in line with Service-Dominant Logic (SDL) (Vargo and Lusch 2014, 2017). Value is seen to be co-created through and in social interaction, dynamic resource integration, and the production of new resources, regulated by institutional logics (Vargo and Lusch 2016) and protocols of interchange (Lusch and Nambisan 2015; Maglio et al. 2019). Moving toward student-centric UIC generates new meanings and evolution of useful knowledge, multilevel value creation, and evolution and change over time (Ouden 2012).

Operationalizing the service ecosystem perspective requires the design of innovative services at the touchpoints where value is co-created between service producers and consumers (Sangiorgi, Patrício, and Fisk 2017; Wetter Edman et al. 2013) and policies, rules, interchange, and interaction, together with the institutional arrangements underpin and shape the designs (Frost, Cheng, and Lyons 2019; Sangiorgi et al. 2019). Operationally, platforms (or systems environments) connect individuals and organizations (Cusumano, Gawer, and Yoffie 2019; Parker, Van Alstyne, and Choudary 2016) and integrate the service delivery toward users (Gawer and Cusumano 2014; Lusch and Nambisan 2015; Osorno and Medrano 2020). This integration, often through open innovation, is needed for accessibility, efficiency, affordability,

delivery, and to develop content constantly, and supports building a coherent customer journey and experience (Wetter Edman et al. 2013). In turn, operations management practices and ICT-related service engineering in work systems help to identify and order value propositions and support service analysis, modelling, catalogues, and agreements (Alter 2012; Hiles 2002). Taken together, service design, service engineering, co-design, and participatory design approaches are relevant for the development of innovation intermediaries in student-centric UIC contexts (Holmlid 2012; Ostrom et al. 2015; Sanders and Stappers 2008; Sangiorgi, Patrício, and Fisk 2017).

Figure 2 presents the key elements that make up the student-centric UIC ecosystem construct for the study. The nine elements of the construct have been adapted from Isenberg (2011), Haley et al. (2016), and Barroca et al. (2017). The construct addresses the specific need to accommodate a student-centric viewpoint as the central issue of the ecosystem.

Research method

As noted, the aim was to foster the competitiveness of Kenya through an initial Nairobi-focused intervention by engaging students, academia, and industry in UIC within entrepreneurial ecosystems. This was seen to involve developing existing markets or potentially to disrupt them (Colombo et al. 2019; Malecki 2018) while creating employment, new business, and social innovation and expanding networks (Abeka 2011; Nafukho and Muya 2010). From this starting point, the study was built up through a series of four steps, adopting the process of the Double Diamond model from the Design Council (2015). Launched in 2004, it is a globally recognized design-driven process tool and approach, built for exploring issues deeply (divergent thinking) and then taking focused action (convergent thinking). The first diamond helps to discover what people understand as the key

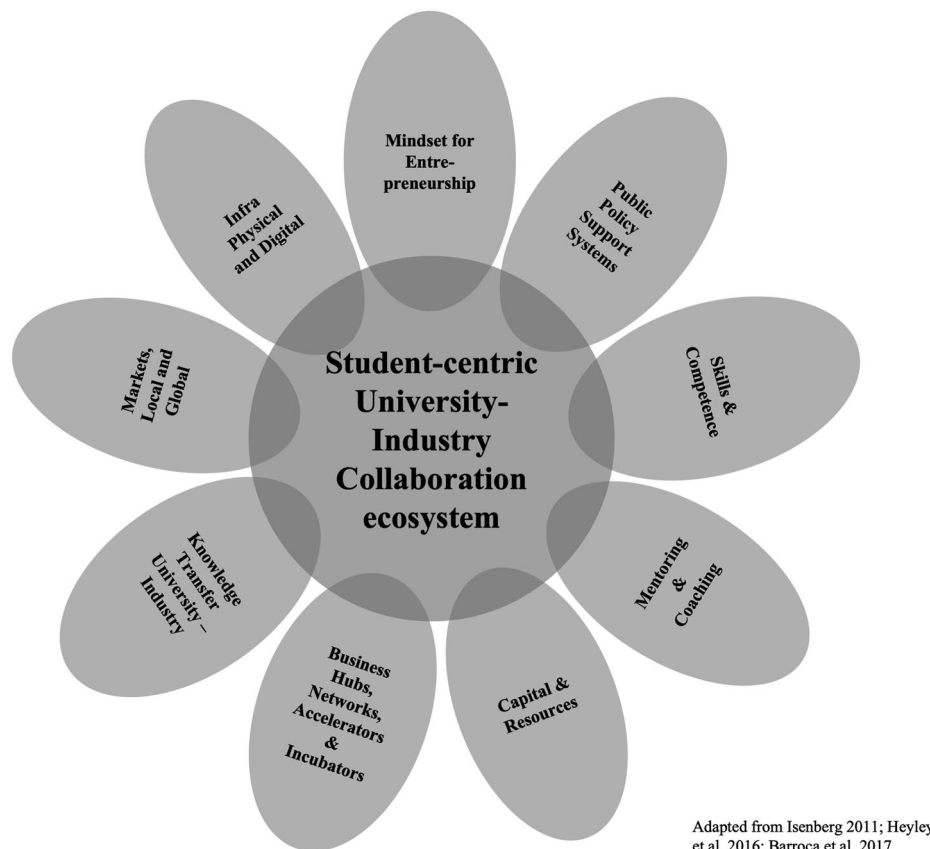


Figure 2: The student-centric UIC ecosystem construct.

issues or problems in an ecosystem. This involves close contact with the stakeholders affected by the issues. The insights gathered help to define the challenges and opportunities. The second diamond involves developing initial answers and delivering tested and validated solutions. The process is not linear, but iterative, with an abductive nature (linked to the idea of pragmatism), applying qualitative research methods, approaches, and tools. The steps explored the playing field, defined the focus, developed and validated the concept, and prepared for implementation (see Figure 3). The whole study can be understood as an exploratory (single) case study, undertaken within a qualitative research framing (Miles and Huberman 1994; Yin 2003). It is furthermore framed as a people-centred, iterative, interactive, and evidence-based process with key Kenyan stakeholders, building on the principle of human-centred approaches originating from Design Thinking (Brown and Wyatt 2010; Cooper, Junginger, and Lockwood 2009). The open research context and the need to iteratively address the emerging issues led to the choice of the Double Diamond as the key underpinning research process model, while the single case study method was particularly well suited for the overall research and design context. Design Thinking tools and methods were used to uncover user needs and key foundational issues.

In addition to reviewing literature and evidence from planning documents and reports, data were collected from the KIEP project and actors directly involved with the initiative, as well as from independent ecosystem-wide actors and potential stakeholders, also using national statistics and international databases. The independent

actors cut across key industries, universities, student groups, and innovation intermediaries operating in the Nairobi entrepreneurial ecosystems. Stakeholders were selected and categorized according to a literature review, looking for the most representative actors in the ecosystem (Osorno et al. 2019).

Besides the secondary sources, altogether thirty-five open and semi-structured interviews were made in twenty-two organizations, with data anonymized for analysis purposes. The selection of the organizations to be interviewed was made through initially consulting expert informants in the public sector, donor agencies, universities, and industry actors. Additional interviewees were identified through the interviews themselves. The aim was to achieve a balanced view across industry, academia (student and staff), the public sector, and non-governmental organizations. While the available time in the field was a major constraint, the study was able to tap into existing studies, key informants, and previous knowledge through the KIEP project stakeholders. The researchers were not limited to these informants but also engaged students through interviews and the second stage workshops. The workshops used Design Thinking methods and were organized along the lines of a step-wise process (Barroca et al. 2017), aiming to uncover the critical issues with the ecosystem, define the value opportunities, scope of the activities, and validate the proposals. Altogether three facilitated workshops were held involving fifteen organizations and thirty-two key actors. The first workshop aimed to co-create and validate the initial scope and approach, while the latter two had the purpose

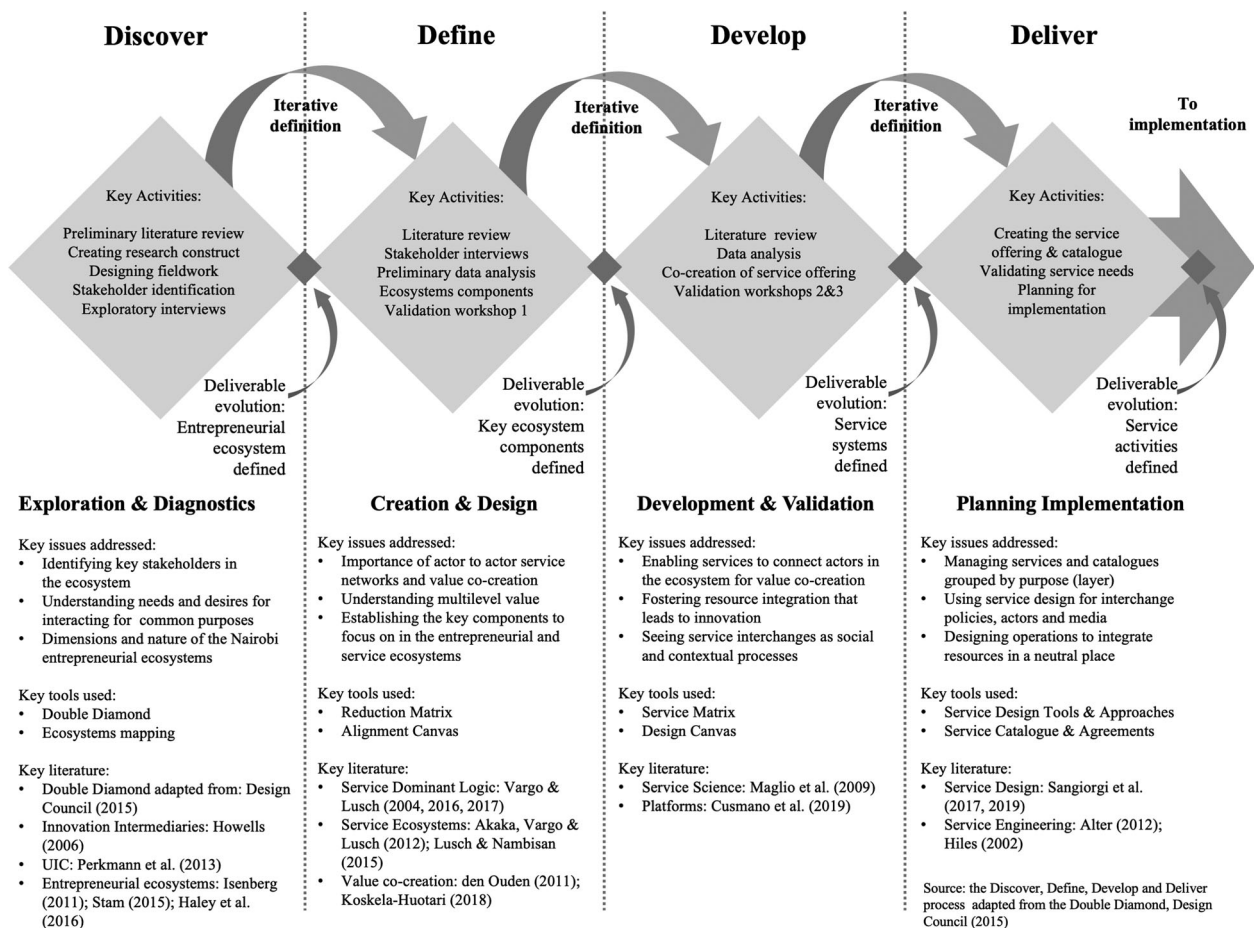


Figure 3: The research and design process.

to co-create and validate the operational content of the service ecosystem.

In the data collection process, deep engagement in interviews and workshop activities were undertaken with eighteen faculty members and eighteen students/student entrepreneurs across ten key Nairobi-based universities. Altogether sixteen private sector organizations (telecoms, manufacturing, agribusiness, banking, tech startups) with twenty individuals took part in the two sets of activities. Furthermore, the activities engaged eleven organizations with as many participants from the public sector, donor community, and innovation and entrepreneurship support organizations.

The research team applied qualitative research methods throughout the document, interview, and workshop analysis processes. A master document was designed to organize the information from the interviews and the research team's notes on secondary sources. Using reduction and systematization techniques and tools (Miles and Huberman 1994), key observations related to the UIC were identified. The information obtained from the workshops (documents, images, video) was similarly systematized, and data reduction techniques and pattern seeking were applied over three rounds of analysis. Finally, data from the interviews and workshops were consolidated and used to identify needs, challenges, constraints, opportunities, and considerations to be used during design and implementation.

The fieldwork for the study was done in 2018 over two three-week-long visits. The research team involved both local and international experts, and the research and design process took eighteen months from start to final reporting.

Findings

Leading in East Africa

Kenya is the economic, financial, and transport hub of East Africa. With a population of 53.5m (Central Intelligence Agency 2020), one-third urban, and a per capita GDP of \$3500 (PPP), it has seen a decade long growth rate of 5% and an expansion of an entrepreneurial middle class. It is an African success story with a growing youthful population, dynamic private (formal and informal) sector, highly skilled workforce, adequate to good infrastructure, and a new constitution. It is also seen to have a pivotal, leading role in East Africa (The World Bank Group 2019, 2020b). However, a high poverty rate (36.1%), unemployment (40%), a young population (40% under 15), and heavy reliance on small-scale agriculture (30% of GDP) remain challenges for development. The modest and narrow industrial base, an infrastructure with significant coverage variance (e.g. only 56% of population with electricity but the highest internet coverage in Africa), and governance are also crucial issues. The capital, Nairobi, with a population of 3.5m (est.), is the 14th largest in Africa, with a GDP (2018) of 14.9 billion

USD (Nairobi City County 2020). While the entrepreneurial ecosystem of Nairobi involves twenty-five main universities and institutions of higher education (UNIPAGE 2020) supporting the development of human resources, the quality of the educational offerings varies greatly, and engaging talent remains a key challenge for industry.

A number of institutions have set up incubators, accelerators, and hubs with varying success, and private sector-led research hubs have increasingly been strategically located in Nairobi (e.g. IBM Think Lab). Among the top higher education institutions, UIC is currently undertaken in various forms by multiple parties. As an example, the University of Nairobi runs the annual Nairobi Innovation Week with a linked startup summit event. The Chandaria Business Innovation and Incubation Centre of Kenyatta University hosts entrepreneurship programmes that have strong links with industry. In turn, the Jomo Kenyatta University of Agriculture and Technology is engaged with the Nairobi Industrial and Technology Park, providing infrastructure that supports growth companies, while the United States International University Africa is involved in agribusiness management and entrepreneurship. Strathmore University, in turn, has hosted ICT for Development (ICT4D) activities, while other institutions are engaged in complementary areas. While it is apparent that a wide set of activities are currently undertaken within the UIC context across the entrepreneurial ecosystem, much of the offering seems to be closely associated with individual organizations, and as the informants noted, access can be quite restricted. There are clear challenges in terms of sharing the latest knowledge and practices across the ecosystem. It also appears that the current practices of UIC are closely linked with the aims and operational modes of educational institutions, with less attention given to the markets and industry. Many of the industry informants indicated that the aims and methods of the educational delivery in the current ecosystem are not fully relevant to industry needs, and accessing talent remains a challenge.

Entrepreneurship as a career option has become significantly more desirable since Safaricom launched the now widely diffused mobile payment service M-Pesa in 2007; with high unemployment, this is also a forced choice in many cases. In parallel, as a forerunner, the iHub was set up in 2010 as a highly successful innovation hub supporting and mentoring startups. Since then, a plethora of co-working spaces, innovation hubs, and accelerators with varying degrees of attached innovation services have emerged, together with NGOs supporting entrepreneurial education, events, and workshops, and knowledge diffusion (e.g. Youth Entrepreneurship Facility (YEF) Africa, Digital Opportunity Trust (DOT) Kenya, or Aspen Network of Development Entrepreneurs (ANDE)). Concurrently, other non-state actors have increasingly supported entrepreneurship (e.g. Safaricom Foundation), together with an emerging set of angel investors as well as venture capital funds (e.g. Savannah Fund, Novastar) and microfinance providers (e.g. Rafiki Microfinance Bank, Uwezo Microfinance). Together, the actors have transformed the landscape of the entrepreneurial ecosystem. The trend of increasing FDI by large corporations

and private remittances have supported this process. The key challenge of the entrepreneurial ecosystem of Nairobi is linked to its diffuse nature: while there are many actors, integrative activities are not well developed, and understanding the impact of the wide range of actors and activities remains elusive.

Initial steps in the study

After a preliminary literature review, an initial research construct was built with entrepreneurial ecosystem elements derived from the literature (Haley et al. 2016; Isenberg 2011; Stam 2015), practical observations, and global experience (Barroca et al. 2017; Foster et al. 2013). This included the elements of public policy, skills and competence, mentoring and coaching, capital and resources, business networks, knowledge transfers, markets, infrastructure, and mindset for entrepreneurship (see Figure 2). These elements also addressed the key potential areas of support identified by the informants, with interviews giving insights on the desired characteristics of the elements.

The interviewed stakeholders and the initial workshop participants indicated the importance of supporting inclusive and balanced participation of industry actors, students, and academia on the same level of engagement in a neutral space. The informants noted the need for the initiative to deliver tangible value through joint commitment and a clear purpose and shared vision, integrating and sharing resources within the ecosystem. Placing students in the middle of the discussion, talent was seen to be a critical resource needed to achieve success. Improving internal and external networking was also seen to be important as an enabler and facilitator of the entrepreneurial interaction between institutions that support innovations. As one director for university-industry partnership of a public university noted:

... we know that collaborative research is a challenge to address, the platform must promote research and provide an avenue for industry problem solving, also could be a funnel for tapping into entrepreneurial skills. Of course, we need matchmaking between academia and industry ...

The interviews with the stakeholders furthermore indicated the need to identify the sectors and actors participating in the ecosystem. Institutions were recognized as key players, and accurate information about the ecosystem was seen to be needed for good decision-making, governance, and policymaking.

The initial phase of the research validated the construct and the set of elements in the Nairobi context, the need to consider common goals and strategies, top-down and bottom-up solutions, and complementing existing structures that would support wider value networks. The key ecosystem stakeholders interacting and integrating resources were also identified, together with an initial assessment of the issues to be addressed by the innovation intermediary.

Creating value opportunities and designing the system

The initial exploration led the researchers to propose designing the innovation intermediary as a set of services

to foster value co-creation, resource integration, and interchange. Early on, it was recognized that a single service could not possibly address all of the needs. As an illustration of the concerns related to the multiple needs, an interviewed entrepreneur and leader stated that:

... the platform must connect schools and business, supporting communication and networking. We need Mentorship/Coaching for academia to understand business dynamics. Also, we want information on business management, IP, tax, starting a business, as well as information that would enable the entrepreneur to move from idea to growth e.g. post-academia where would they find an incubator? Investor? [...] Government has a key role, because there is a hostile business environment. Policy is the key. Business does not grow because of this hostile environment ...

The approach of thinking about a set of services was important, as it was seen to allow for inclusiveness and equitable participation of both service providers and consumers. Even with occasional and light engagement, this was seen to enable defining (and thus diffusing and evaluating) the multiple offering of the innovation intermediary.

The focus on co-creation of value through services led to exploring a service science perspective within a SDL lens (Vargo and Lusch 2014, 2017). The individual services would come together in sets within a wider service ecosystem (Akaka, Koskela-Huotari, and Vargo 2019; Akaka, Vargo, and Lusch 2012), to not only create value through exchange, but also through the use and the context of UIC. As an industry leader highlighted, the value creation aspect was a central concern:

... The platform really has to deliver value. It is not about putting organizations to do something and just want to fund it and try to achieve something, if there is no value. So, it would be very, very important (for any stakeholder to participate), to make clear the value that will be delivered to them [...] so there would be commitment regarding the resources that are needed ...

The initial exploration also led to understanding value co-creation through a multilevel model (Ouden 2012), within which individual actors perceive receiving benefits and creating value on very personal levels through tangible touchpoints. Organizations would have a different, complementary view of value through access to new knowledge and the talent of future generations of innovation leaders. The service ecosystem itself would benefit from the stability of actor participation, while society benefits from enhanced national competitiveness. In order to deliver value through touchpoints, the services would need to be organized into a set of interdependent platforms (Cusumano, Gawer, and Yoffie 2019; Parker, Van Alstyne, and Choudary 2016).

The set of services for the innovation intermediary was identified through the interviews and validated in the second set of workshops. This involved three key areas of activities, complementary to the network of existing incubators, hubs, accelerators, and co-working spaces in Nairobi. Through *sharing content*, the aim was to identify ecosystem-wide opportunities of collaboration through the diffusion of curated content, supporting the development

of a mindset for entrepreneurship. Aimed to foster collaboration and the build-up of joint activities and opportunities between industry and academic partners, *promoting partnerships* would support knowledge transfer between existing academia and industry players. Finally, *mentoring for impact* activities were intended to engage willing partners to develop and share the value added in the activities and enable further rounds of collaboration. These findings further refined the elements of the original research construct to fit the specific needs identified in the Nairobi context.

Developing and validating the service offering

The initial concept was validated and updated with senior stakeholders representing the KIEP project to ensure policy alignment and resourcing. This feedback was integrated into the design of the second set of workshops. These aimed to further co-create and validate the service model with stakeholders, and to ensure alignment and complementarity with the wider entrepreneurial ecosystem. In this process, videos, tools, and notes were systematically used and analyzed to capture the inputs of the activities within a qualitative, participatory, and user-driven approach.

During the two-day-long workshops, the participants co-created the set of platform services while identifying the benefits, using service design and Design Thinking methods and approaches. Insights from participants reiterated the need to connect academia and business better, support communication and networking, and provide access to incubation, business acceleration, and investors. The aim should be to allow students to not only obtain support for their ideas but also to present it to investors and engage in real partnerships with industry. As the director of one of the main entrepreneurial hubs noted:

... a service platform should help entrepreneurs to give access to resources that help to move from the idea level to the next level as well as make them investor ready. The platform also could be the convenor of all hubs, incubators, worker spaces, entrepreneurs, and startups. something that is yet to happen in the current ecosystem where everyone operates in silos ...

The dire need for mentorship and coaching (specifically for academia to understand business dynamics) was confirmed, as were the information needs on business management, intellectual property, taxation, starting a business, as well as knowledge to enable moving from ideas to growth. The role of policy and the government was highlighted, and concern emerged on hostile business environments blocking new initiative and growth. As one academic researcher stated in the workshop:

... government has to sponsor mentorship in the ecosystem by giving incentives to the organizations but as a policymaker too. It is important to have all the rules very clear ...

The co-creation with stakeholders also created further insights toward the design of the intermediary. Connecting actors was seen to be possible through organizing the work into sets of services on interrelated platforms that could address the differing (but interrelated) needs present

throughout the ecosystem. The initial sets were further developed to group and organize the service delivery around the three entrepreneurial ecosystem elements in a non-hierarchical multilevel platform structure (see Figure 4). Each level could be accessed individually, but they can also form a continuum in service delivery. The varying degree of open innovation also emerged as an issue. Sharing content was seen to be based fully on open innovation, with free access by all, serving as the entry point for much of the initial collaboration. As the main promotion channel, it also should have a very low commitment threshold. A student entrepreneur, representing a team that worked on analyzing the design noted:

... talent is spread across the country, and the platform will help to identify specific skills for projects, so people could participate not only as full time but as freelance by project [...] the value of the platform is mainly in the availability and confidence of information [...] knowledge management must focus on the validation of ideas and information, curation by someone else is necessary ...

The services promoting partnerships would have a more closed nature, as they require more commitment and engagement from the participants. The bulk of the platform projects would be taken forward at this level, identifying, setting up, and supporting the management of the student-industry challenge projects. As a second student entrepreneur noted:

... platform will allow students to obtain support for their ideas, if a student has an idea, these people can present it to investors and make partnerships instead of just obtaining support for the ideas [...] academia does a lot of research, we are looking for a platform in which research work can be linked with loans or grants ...

The third level, mentoring for impact, was seen to be a separate service. It is limited in its reach and scope as it depends on scarce resources and a voluntary 'giving back' mindset of the entrepreneurial community. Over time, as the practices of mentoring develop and expand, it is assumed that access would also improve, and the service would become more open to all.

Planning for implementation

Mindful to the fact that the platforms would operate as sets of services within the innovation intermediary, a further need was identified: managing the organization itself. A cross-cutting management component was embedded in the concept design, considering roles, responsibilities, and governance. To enable an intermediary to operate in a neutral, equitable space, a membership organization form was proposed that would aim to achieve financial sustainability after an initial period of public funding. This was perceived to be challenging, as it would require the intermediary to evidence its value creation in short course. The organizational form was seen to be a key enabler in this, providing a steady stream of tiered revenue from membership fees from all of the participants, and through project-specific contributions from industry.

The service offering was further developed through applying a service catalogue and a mapping matrix to group and model the offering. This involved also

identifying key components, service policies, roles, and responsibilities, as well as the location for providing services. To support open innovation practices within the service ecosystem, the platform design needed to foster co-creation and thus interaction between the actors – this was seen to need a dedicated physical place in addition to the virtual interaction. The concept involved setting up and equipping a multifunction working space to host activities and the organization itself. In a subsequent step, a launch and scale-up strategy was prepared, together with the revised and refined key activities, services offered, stakeholders to be engaged, and the initial steps to take in the build-up of the services.

As a part of the launch, an operations manual was designed, based on detailed core activity identification supporting the value proposition of each level of the platform. Key management processes and the principles were established to ensure the value delivery by the platform. As part of the launch strategy, a list of potential organizations that could be responsible for knowledge transfer and participate in the partnerships was co-created with participants. The role of academia in leading the integrative conversations with industry was extensively discussed, and a leading academic in the field of innovation noted that:

... One way to bring actors and conversations about innovation into the platform, we must consider that academia could lead that, I mean, creating a group with all the academia innovation efforts, they could initiate, as consortia, these conversations and bring industry involved [...] neutrality is very important here ...

The final development step involved creating the organizational structure and defining the detailed management roles and responsibilities, together with the governance structure that enabled a neutral position in the wider ecosystem. As the very last activity, the validated design was presented in a project report to the senior stakeholder group.

Discussion

Early on, we noted that student-centric UIC had been seen to be beneficial and transferrable in the context of industrialized countries, recognizing that they are built over time on mutual trust, motivation, and empowerment of the participants. In the move to the Nairobi context, it was initially not fully clear what would be the key areas where novel forms of student-centric UIC could add value to the existing ecosystem. Noting that multiple educational institutions currently engage in UIC in the Nairobi environment, the proposal in this study adds complementary student-centric elements to the wider ecosystem. Taking the initial research construct as the starting point, the interviews and co-creation workshops identified three key elements that would form the core of the intervention. In the first place, supporting the development of a mindset for entrepreneurship and shared and curated open access content would enable ecosystem-wide opportunities for knowledge sharing and collaboration. This was seen to address the integration issues related to a fragmented entrepreneurial ecosystem and a landscape where actors optimize their activities and

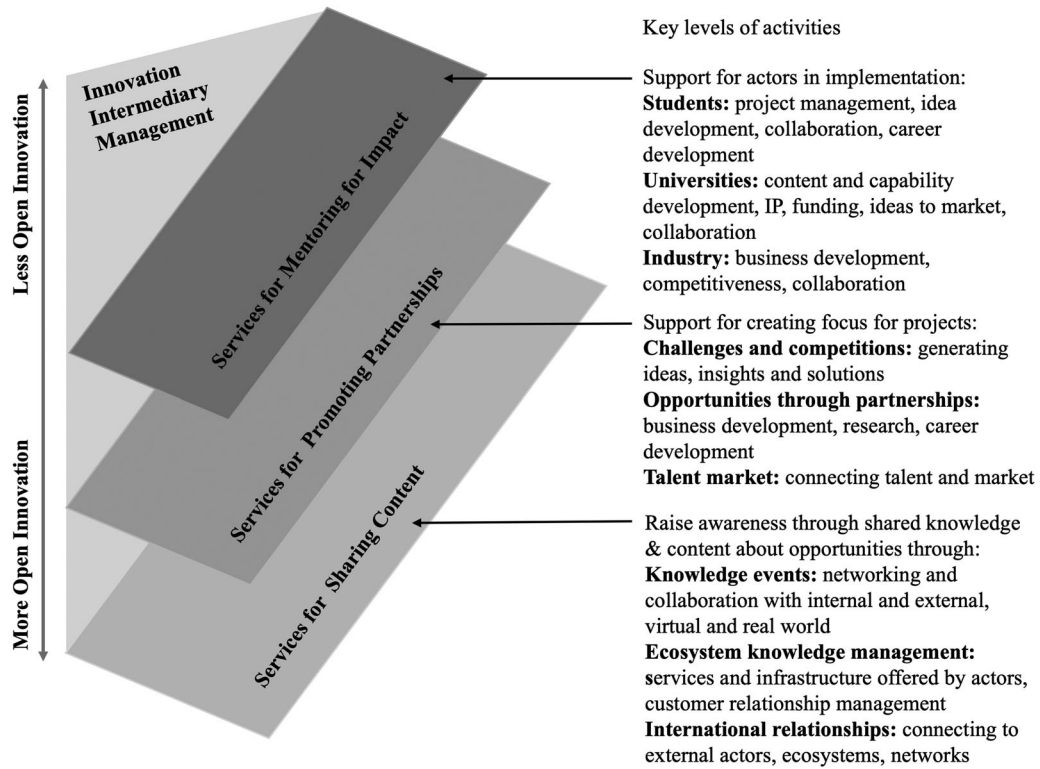


Figure 4: The multilevel platforms and service activities.

mediate access from their own perspectives. Fostering collaboration and the build-up of joint activities and opportunities through promoting industry-academia partnerships would further support knowledge transfer between existing players. This was seen to bring actors together around common agendas, facilitating access to talent, knowledge, and resources. It would also expose students to new forms of equitable participation and novel learning opportunities, while also facilitating the access to talent by industry. Finally, engaging willing partners to develop and share the value added through mentoring activities would enhance and enable further rounds of collaboration. This hands-on engagement would closely support bringing up the next generation of innovation leaders for Kenya.

Local institutions, culture, and organizational arrangements can and will have an impact on any initiative, but there seems to be no reason why student-centric UIC cannot be a success story when talent and novel thinking come together to innovate. That said, how organizations go about setting up and managing student-centric UIC can make a significant difference to the outcome. In the study context, a key insight was to see the innovation intermediary as a multilevel set of services, organized into platforms, constituting a service ecosystem that exists within the wider entrepreneurial ecosystems of Nairobi. Seen through the lens of Service Dominant Logic, the service ecosystem (Akaka, Vargo, and Lusch 2012) enables value co-creation, resource integration, and interchange between the actors. The service perspective also allows for an equitable and inclusive participation of both producers and consumers of the services on the proposed platforms. As the service ecosystem and related platforms are seen to be independent of the other

key actors, it can create the neutral grounding that was called for by many informants.

In Figure 5, we propose a model of the steps to take when creating innovative intermediary services for student-centric UIC in novel contexts. While the four steps are an abstraction of the Nairobi process, they synthesize previous knowledge and practical experience of the iterative and co-created front-end process. While recognizing that the implementation of the services on the ground creates the tangible offering and thus delivers the potential impact (with evolution of the concept happening during the process), we argue that getting the front-end right is both an initial core challenge and a central success factor (e.g. Alam 2006; Williams and Samset 2010). Furthermore, as the key informants noted, equitable participation does matter – it is a key enabler for building sustainable commitment and long-term success.

The research demonstrated that the principles of setting up student-centric intermediaries are important. We suggest that four key principles need to be taken into account when creating an innovation intermediary that aims to deliver on student-centric UIC: establish the reason to collaborate, understand the value to be created, create the neutral space for collaboration, and plan the implementation detail.

Initially, it is necessary to identify the common need and rationale for collaboration and the sharing of knowledge, resources, and practical experience. In the Nairobi case, the overall rationale was driven by the need to enhance long-term economic competitiveness; other types of needs and related rationales may emerge in different contexts. The common denominator is that

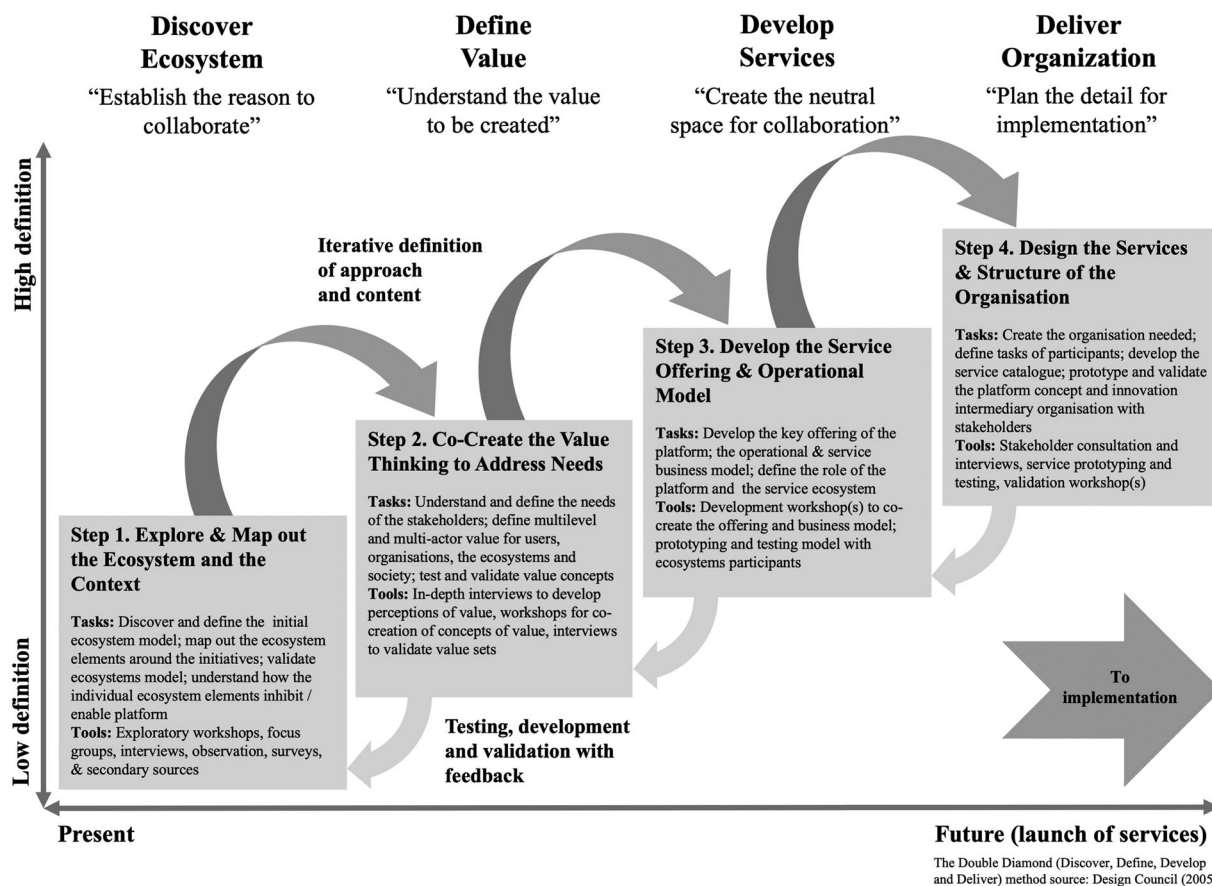


Figure 5: The student-centric UIC innovation intermediary design process.

collaboration is embedded in ecosystems where actors are interdependent and do well through reciprocal exchanges and common mindsets (Clarysse et al. 2014; Ouden 2012). Success depends on understanding these systems and being able to foster them to enable innovation intermediaries to co-exist and co-evolve around common agendas. This requires an understanding of what integrative and complementary activities could and should be addressed by an intermediary. Secondly, there is a need to understand the value that is to be created. The Kenya informants highlighted the need for value to be both co-created and shared; if not, partial optimization will undermine collaboration, trust, and engagement. Users, organizations, and ecosystems will differ in their perceptions of what is valuable (Koskela-Huotari 2018; Ouden 2012), and adopting a service perspective makes value co-creation through interaction understandable (Vargo and Lusch 2014, 2017), enabling organizing the activities of the intermediary in a coherent fashion. Thirdly, the stakeholders widely indicated that collaboration needs to happen in a neutral space, where the few cannot appropriate most of the value created. The delicate balance of UIC with a deep engagement of students is easily disturbed; a common space is needed to enable equitable participation and resource integration (Banerjee and Ceri 2015; Koria 2016). In the fourth place, the implementation of activities needs to be planned. Sustainable solutions must be found to launch, sustain, and develop further the range of activities, not only in financial and technical terms but also in terms of maintaining the continuing interest that parties

have to engage in UIC. The intermediary must understand its vital role, whether it be fostering engagement or commercialization (Perkmann et al. 2013), diffusing knowledge, supporting the management of innovation, or knowledge networks (Howells 2006). In many, if not most cases, these activities constitute the delivery of knowledge-intensive services. The services and delivery platforms need to be defined and designed in ways that sustain the value creation. This also implies that the organizational design of an innovation intermediary and the activities it undertakes matters and must be fit for purpose.

Conclusion

In this study, we examined the process of fostering student-centric university-industry collaboration through a research and design process of an innovation intermediary within the entrepreneurial ecosystem of Nairobi, Kenya. The overall aim was to foster competitiveness, innovation capability, and collaboration while educating new generations of innovation leaders. Using Design Thinking and service design approaches, extensive consultation, interviews, co-creation, validation workshops, and a multi-stage literature review, we initially identified the needs and gaps in the current Nairobi context. Key insights from the research process significantly shaped the research and design project outcome, and having a student-centric focus had a major impact on how collaboration could and should be undertaken. Research indicated that an innovation intermediary should be a neutral, integrative organization around which sets of services could

be built up. Locating the intermediary within an entrepreneurial ecosystem enabled linking it to the existing actors in the Nairobi context, defining the core complementary activities as sharing content, promoting partnerships, and mentoring for impact. Identified needs were translated into a set of services in sharing content, promoting partnerships, and mentoring for impact. These were further built up to become the tangible offering of a student-centric innovation intermediary, with detailed services, management structure, launch and scale-up strategies, and an organizational and governance setting. Defining the intermediary as a knowledge-intensive service within a service ecosystem was central to shaping the understanding of how value would be co-created between the parties on multiple levels and platforms. Guiding principles in setting up intermediaries included establishing the reason to collaborate, understanding the value to be created, creating the neutral space for collaboration, and planning the implementation in detail.

For practitioners, especially ones who work in emerging economy contexts, we hope this paper informs and adds value to initiatives linking industry and academia with students to create value for society through novel forms of innovation. For researchers everywhere, the Nairobi case adds a further building block to our knowledge base of how student-centric university-industry collaboration can be set up to deliver services within entrepreneurial ecosystems. As this paper touches on a single case, we expect that there is ample room to expand research into multiple contexts. This study has addressed the challenge of transferring student-centric UIC practices to an emerging economy context, and it contributes to the conversation around fostering innovation in emerging economy entrepreneurial ecosystems contexts. As a key contribution, we also presented a step-wise model to demonstrate the process of diffusion of an intermediary into novel contexts.

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