Designing Sustainable Startup Support for Rwanda and Kenya

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Master Thesis

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Summary

Innovation-centered entrepreneurship drives economic development. It is also a method for addressing the environmental and social issues that result from and impair economic growth. The rapid and continued economic progress in Rwanda and Kenya in the last decade has shown the power of entrepreneurship ecosystems- interconnected people and things supporting startups. However, amid this growth and potential, how can an impact be made on environmental and social concerns also?

This project sought to design a solution to help innovation hubs in Rwanda and Kenya increase their positive impact. Innovation hubs include incubators, accelerators, and other programs that support entrepreneurs in creating and growing their businesses. They are the first stop for many new entrepreneurs as they begin their ventures. As a result, hubs can significantly influence startups and the larger entrepreneurship ecosystem.

This project had two aims:

- Understand the current entrepreneurship ecosystems in Rwanda and Kenya
- Design a solution to help hubs increase their impact on people, the planet, and prosperity (three Ps)

Literature and field research was conducted to create a picture of the ecosystems in which hubs operate. The ecosystem was explored by interviewing representatives of the most common stakeholder groups. This investigation identified stakeholders' opportunities and challenges in supporting entrepreneurship and sustainability.

Then, hubs were interviewed to understand their current practices and needs. Finally, a model was developed to assess the impact of hub program activities based on behavior change theory. This model allowed hubs to understand their potential influence directly instead of estimating it based on startups' performance.

This model was used within the design of a toolkit. The toolkit guides hubs to reflect on their activities and policies through a thee Ps sustainability lens. This process guides hubs to upgrade their current program and generate ideas for new activities to meet their sustainability goals. The toolkit also includes a pilot template to help hubs identify resources to test their impact ideas. For example, in testing, the use of the tool led to an upgraded environmental sustainability workshop for one hub. The new workshop will allow them to reach 3X more entrepreneurs annually.

Hubs often struggle to find sufficient funding and resources for their current programs. The toolkit helps them to optimize their existing resources. Facilitated sessions also lead hubs to identify the new people and financial resources they may need to implement their new ideas. Using a sustainability lens helps ensure hubs make the impact they seek and entrepreneurs get the support they need, now and in the future.

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Part 1: Design

This part of the report walks through the process used to design the final solution. The research is summarized in this part to focus on highlights which related to the design.

The full details of the research are available in Part 2.

Introduction

Key Concepts

Overview

Entrepreneurship ecosystems drive economic development (Roundy 2016). Entrepreneurship also provides a method for addressing the environmental and social issues that result from and impair economic development (Roundy 2016). This combined power of entrepreneurship to drive economic, environmental, and social progress has brought conversations about how to support entrepreneurship and social progress to the forefront in the last decade. This project was undertaken to understand entrepreneurship support structures in Rwanda and Kenya and how they can accelerate progress. The next section provides an understanding of the main topics of this project.

Sustainability

Sustainability refers to "meeting the needs of the present without compromising the ability of future generations to meet their own needs." (UN World Commission on Environment and Development 1987). Together, environmental health, social equity, and economic vitality comprise the three pillars of sustainability. These three elements can also be referred to as the Triple Bottom Line for organizations to measure sustainable success. Going one step beyond providing metrics, the triple bottom line can serve as the decision making DNA for all organizations and businesses (Elkington 2018). Organizations which endeavor to account for the environment and social equity within their businesses have additional market opportunities generated by the sustainabile development goals were expected to exceed $12 trillion annually by 2030 (Elkington 2018).

Entrepreneurship Ecosystems

There are several models that describe the people, services, and structures which encourage entrepreneurship. Entrepreneurship ecosystem is the term used to describe the set of people and factors that work together to support businesses creation (Figure I.1). According to Isenberg (2010) it is “a set of interconnected elements such as leadership, culture, capital, markets, human skills and support that foster entrepreneurial development.” The elements of these systems may differ based on their specific focus.

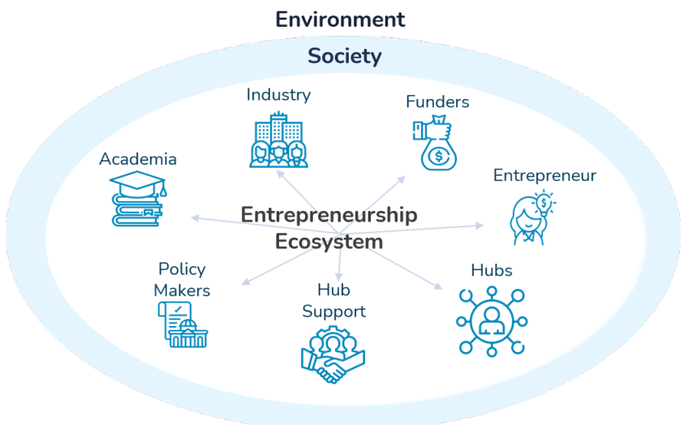


Figure I.1 Stakeholders in an Entrepreneurship Ecosystem

Introduction

Entrepreneurship and Startup Support

Entrepreneurship support organizations, also called hubs, developed to provide a gateway for entrepreneurs into the ecosystem and to help them develop their skills and businesses. Hubs include incubators, accelerators, innovation hubs and any structure that assists emerging businesses by providing physical, financial, or educational support services (Grimaldi 2005).

Rwanda and Kenya

Rwanda and Kenya are two of the seven countries within the East African Community. Rwanda is a small country with quickly growing economy evident by its doubled GDP between 2013- and 2020 (NISR 2021). Kenya is the economic leader in East Africa and also one of the largest economies on the continent. Kenya also serves as a regional host country for ISHOW, the Innovation Showcase social entrepreneurship accelerator, hosted by the American Society of Engineers (ASME).

ASME’s Engineering Global Development programs strive to improve quality of life by building engineering capacity to solve urgent challenges in underserved communities. ASME is currently conducting a longitudinal study of the impact of ISHOW on the accelerated businesses and their economic, environmental, and social development. To support this study, ASME had two main interests with respect to their collaboration in this project.

- Understand the current entrepreneurship ecosystem
- Understand how to scale the sustainable impact of their entrepreneurship support programs

Research Questions

These interests were synthesized into the research question, how do innovation hubs in Rwanda and Kenya impact sustainability in the entrepreneurship ecosystem?

1. What influences sustainability in entrepreneurship ecosystems?
2. Who are the stakeholders in the entrepreneurship ecosystem?
3. How do hubs currently practice triple bottom line sustainability?

Overview of Design Process

To investigate this question, a design process inspired by two design methods was followed. First, the Double Diamond (Ball 2019) was used. The clear research and design aspects of ASME's motivation aligned with the two instances of divergent and convergent thinking proposed within this method. Second, co-evolution of problem and solution was used. Co-evolution supports using ideas to probe and uncover more about the problem in a nonlinear fashion (Dorst 2001).

Discover: The research process contained three parts. A brief summary of each part is in Chapter 1. A full analysis for each is in Part 2 of the report. First, literature was reviewed to understand entrepreneurship ecosystems and what they look like in Rwanda and Kenya (Chapter 6). This provided culturally relevant context and identified the stakeholders within the ecosystem and system factors that hubs influence. Next, a combination of interviews and literature provided a picture of each stakeholder and their role within the ecosystem Chapter 7). Interactions between stakeholders were visualized to show new, weak, and strong relationships and opportunities to develop strong partnerships. Stakeholder needs and challenges were identified through the synthesis of clusters and themes following the DIK scheme (Sanders and Stappers 2012). Finally, interviews with hubs provided insights into current best practices for impacting sustainability as well as the methods hubs use to create impact (Chapter 8). These insights identified which activities to promote and scale. It also identified overlooked areas to create impact.

Define: This phase used a co-evolution to define a vision, design challenge, and design criteria through the ideation and selection processes. A design vision is first synthesized based on the research. Then ideation and selection is used to reduce the design solution and problem space concurrently.

Develop: Two parallel paths of development occurred in this phase. Chapter 3 details the development of a concept based on the design challenge. Rounds of iteration between prototyping and testing led to the final solution. In parallel, a strategic vision was created based on the design vision and ideas identified in the ideation and concept development phases. (Chapter 4)

Deliver: A plan of next steps is provided for the client related to the final concept and its output.

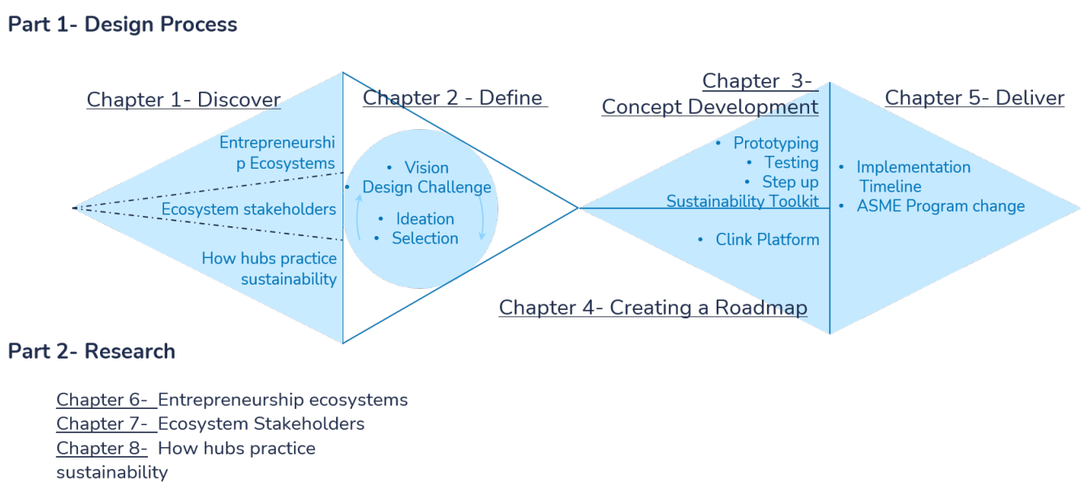


Figure I.2 *Design Process Used Throughout the Project*

Chapter 1
Discover

Chapter Contents

Section 1- Entrepreneurship Ecosystem Factors

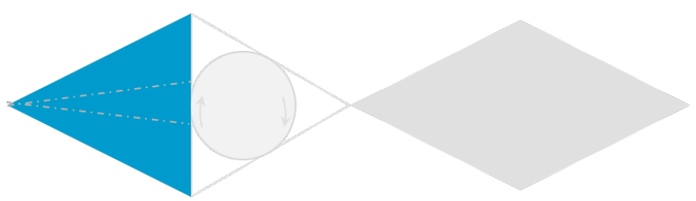
This section answers the first sub question- What influences sustainability in entrepreneurship ecosystems? Analysis of ecosystem factors provided context of the entrepreneurial cultures in each country and key ecosystem factors that hubs influence (*Fig 1.1*).

Section 2- Entrepreneurship Ecosystem Stakeholders

This section answers the question- who are the stakeholders in the entrepreneurship ecosystem? Research into ecosystem stakeholders and relationships yielded themes that described the challenges hindering attainment of triple bottom line sustainability. These themes also described needs and opportunities for more engaged stakeholders.

Section 3- Hubs- Practices and Impact

The final section investigates how *hubs* currently practice triple bottom line sustainability. Analysis of hub programs through interviews and site visits revealed best practices for impacting sustainability and observations to inspire improvements. A model was developed to determine the potential impact of hub program activities.



In this phase of the project, research was conducted to understand how hubs impact entrepreneurial ecosystems in Rwanda & Kenya. This research was conducted in three parts with each part providing the method and answer to one research sub question. The scope of the research zooms in with each question. The focus initially is the ecosystem as whole, then the people within the ecosystem. Finally, the research concludes with investigating the stakeholder of interest- innovation hubs. This outside in view provided opportunities and needs at each level to drive solution development. These insights are provided at the end of each section (Figure 1.1).

Figure 1.1 Key Insights for Each Research Chapter

Entrepreneurship Ecosystem Factors

Method

Literature research was conducted to answer the question "what influences sustainability in entrepreneurship ecosystems." This provided the stakeholders and factors that affect the ecosystem and identified the pathways that hubs influence. These factors also provided a framework to create an overview of the current entrepreneurship ecosystems in Rwanda and Kenya. Analyzing this overview provided potential design opportunities to drive sustainability into each entrepreneurship ecosystem.

Main Concepts

Entrepreneurship ecosystems are a set of interconnected people and factors working to drive economic development through new businesses. They can be modeled as three groups of factors (Spigel) which influence each other in this dynamic system (Tiba 2020). Within these factors, hubs primarily impact the ecosystem through their support services, networks, and culture (Figure 1.2).

Factors for Hub Influence

Support services include the workspace, mentoring, workshops, networking, business and technical expertise hubs may offer. These may be offered within a program or on an individual basis.

Networks include the mentors, investors, training facilitators, subject matter experts and others who complement the knowledge and skills of the hub staff in supporting entrepreneurs.

Culture refers to the common ideas, practices, and behaviors within the ecosystem. Hubs influence here relates to the fact that entrepreneurs' impressions of the ecosystem are initially formed based on their experiences in hubs. The policies of the hubs along with the actions and ideas of the members, staff, and network all influence culture.

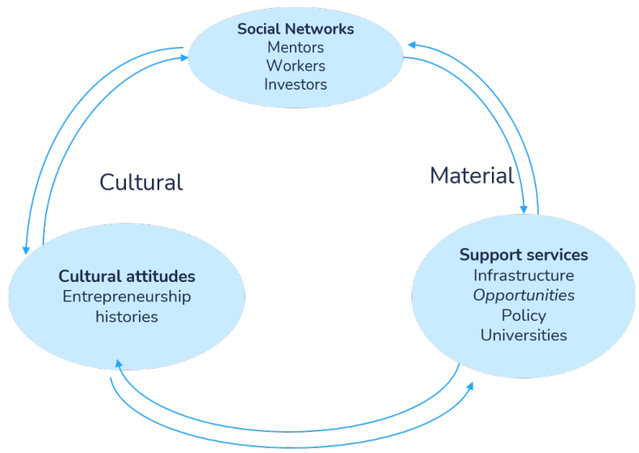


Figure 1.2 Factors Hubs Can Use to Influence entrepreneurship ecosystem (based on Tiba et al 2020)

Key Insights for Design

Through synthesizing a picture of the current entrepreneurship ecosystems in Rwanda and Kenya, three potential design opportunities emerged.

Facilitating a sustainability oriented support pipeline- In Rwanda, there is an understanding of the need for environmental conservation social impact evident in the startups and laws. An example of this is the ban on plastic bags. However, the societal culture favors stability in life and choice of work. Demonstrating the pathway from idea to business along with the available support opportunities may inspire more social entrepreneurship.

Showing the economic value of social entrepreneurship- Kenyan culture supports the idea of solving one's own problems. This encourages both profit-driven and impact-driven entrepreneurship. However, the strong example of successful financial technology companies has made this a popular path. Developing ways that show societal challenges as offering economic and impact value may start to shift the economic focus.

Teach social and environmental impact tools for technology- Both countries are investing heavily in infrastructure and education in information and communication technology. As companies go into this space, their final product or service may not directly address an environmental or social issue, but their approach can.

Other opportunities include building a network with those who have experience implementing environmental and social responsibility into businesses.

Entrepreneurship Ecosystem Stakeholders

Method

Within entrepreneurship ecosystems, there are seven common stakeholder groups. These include entrepreneurs, innovation hubs, funders, academia, industry, hubs support networks, and government. A combination of interviews and literature research was done to understand these stakeholders' roles, motivations, and needs.

This data was analyzed in two ways: by mapping interactions between stakeholders visually and by analyzing quotes drawn from the research according to the DIK (data-information-knowledge) scheme proposed by Sanders and Stappers (2012). Chapter 7 contains a detailed report of the method and analysis for this work.

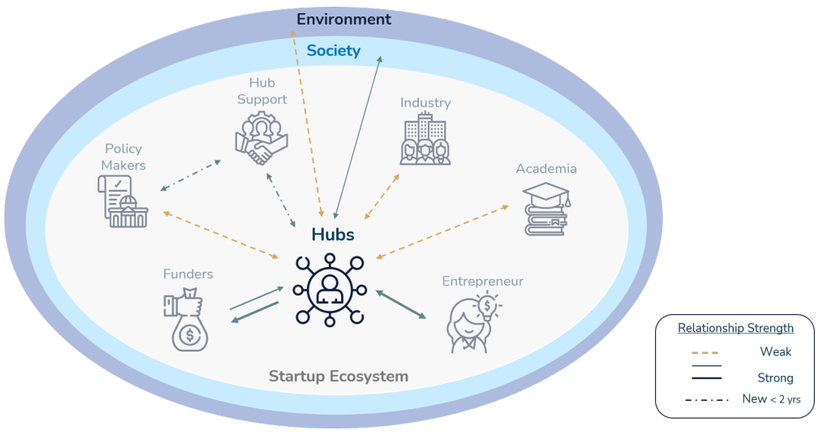
Key insights for Design

Stakeholder Interactions

The Stakeholder interactions maps showed that hubs had weaker connections with academia, industry, policy makers, and the environment (Figure 1.3).

Formalize relationships with academia and Industry- Hubs interact with academia and industry as mentors and sometimes members of evaluation committees. While these relationships are common, they are generally based on personal connections. This poses a challenge when a repeat mentor changes jobs, moves, or simply has a schedule conflict. There is an opportunity for to formalize these relationships with departments and institutions to prevent these challenges.

Provide impact focused support to social and environmental entrepreneurs- While there are innovation programs specifically for businesses tackling environmental issues, the overall connection between hubs and the environment is weak. Within these programs, the focus is often on supporting the economic aspects of the businesses with little support for improving the environmental impact. Hubs can improve their environmental impact by



| *Figure 1.3:* Strength of Hub Interactions with Ecosystem Stakeholders

providing tailored support for environmental and economic needs of entrepreneurs in impact focused programs.

Ecosystem Needs- Themes

Clusters and themes created via the DIK scheme showed several needs and opportunities. The five shown come from entrepreneurs and hub networks. (Figure 1.4)

I know and do a bit for the environment

"I cannot say I am knowledgeable about improving the environment. I think it would help greatly if I can do both [environmental and social mission]."

Entrepreneurs want to learn how to create environmental and social impact within their businesses.
Entrepreneurs are interested and motivating in running their businesses in ways that support the environment. However, for those that know about the envirionment, their knowledge is often impractical or irrelevant to their work. Tangible ways of doing environmentally sound business are needed.

Impossible to be sustainable catering to low income

"It's almost impossible to have a sustainable business in hardware when you're catering to low income people. When you look at home solar systems, cooking stoves, none of them are profitable."

Entrepreneurs need strategies to succed in social entrepreneurship
There are many examples of the challenges and failures in creating a social impact business. Entrepreneurs need strategies and examples of ways to keep a social mission while also attaining at least break even and hopefully profitability

Hubs struggle and seek funding (resources)

"Funding for hubs and startups is a huge need and challenge."

Acquiring funding and resources is a major need within the ecosystems.
Following Covid, hubs are increasingly reliant on donor funds and seeking alternative revenue to fund operations and programs. Hubs spend first on facilities and second on programs so alternate ways to secure program resources are also needed.

Hubs Impacting beyond Startups

"More and more hubs are focusing on different ways to create wider social impact ... that may not be strictly startup-focused"

Hubs have opportunities to offer services beyond startup support and thus build their credibility as businesses
Most hubs have a hybrid business model. This means they receive grants and also earn revenue. Hubs are starting to teach digital literacy and coding courses. They're also adding consulting and event hosting to their services.

Hubs need to strengthen the pipeline

"There is a compelling need for hubs to strengthen the dialogue and cohesion between actors in order to ensure continuity in the pipeline from idea to growth."

Hubs should facilitate partnerships centered around innovation.
With the rapid growth in the number of hubs, some programs duplicate efforts while there are still gaps in the pipeline. Also large companies and NGOs are increasingly interested in supporting and engaging in innovation. Hubs can funnel these resources to provide complete support across the pipeline.

| **Figure 1.4.** Explanation of Themes Used in the Design

Hub Practices and Impact

Method

To determine how hubs practice and impact triple bottom line sustainability, interviews with program managers of seven hubs were conducted. Hubs were selected to include Rwanda, Kenya, and regional programs. They also included hubs that identified as supporting social impact or sustainable entrepreneurship (4) and those without a specific sustainability claim (3). These interviews provided detailed information about each hub's innovation program. Interview data was analyzed in a journey map to evaluate impact to sustainability. Refer to Chapter 8 for details of the research method and analysis.

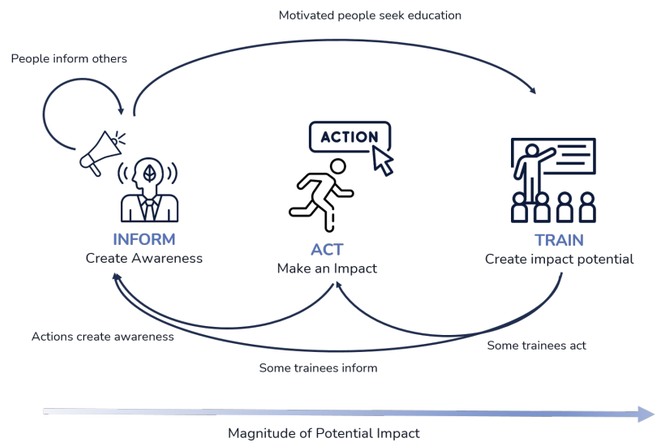
Within the analysis, a model was developed to measure the impact potential of hub activities. Three impact levels were identified based on behavior change methodology and common hub activities. Because impact requires action, the levels are based on potential for each intervention to drive action.

Inform- Hubs share knowledge with their communities and networks through research reports, newsletters and blog posts related to good business practices.

Act- Some hubs have installed solar panels on their buildings for hybrid or completely clean energy systems. Other hubs fund student internships and fellowships for their work within hub programs.

Train- Many hubs train entrepreneurs in design thinking practices to help them ensure their products and processes are a fit for their market and teams.

Creating Impact Potential



| Figure 1.5. Relationship Between Impact Levels

Key Insights for Design

The following insights were drawn from hub practices and observations during the interviews and site visits.

Hubs vary widely in their focus, structure, and mission. Hubs cover different phases of the entrepreneurship journey and target specific industries and technologies. They require entrepreneurs to have certain missions or target demographics. In addition, a single hub may offer programs related to different industries and with different structures. This variety demands flexibility in any approach to support hubs in practicing social and environmental sustainability in new ways.

Leveraging existing stakeholders in different parts of programs. Introducing subject matter experts into the selection process can ensure a good fit between entrepreneur needs and hub resources. Also, funders who help with selection may also have expertise that would be useful in aa workshop or in a mentor.

Hubs can ensure more efficient sharing of information. Specifically in programs offering sector and technology specific support, hubs need to help entrepreneurs find their blind spots. By offering workshops or presentations, they can make sure entrepreneurs have a baseline level of knowledge. It can also help to make the most of engagement with Industry, academic, and NGO stakeholders.

Hubs can increase the reach of their activities by reassessing touchpoints. Several hubs mentioned that they selected the location of programs based on their desire to reach people who do not have access to such opportunities. This same thought process applied to choosing channels for application calls, interviews, and program activities.

Identifying practices and opportunities to impact sustainability motivates more action. In interviews, each hub manager was asked how the team practiced environmental and social sustainability. In thinking of the current practices, two hub manager started to identify additional opportunities

Hubs can offer support that aligns with selection criteria. While all social impact hubs had impact criteria, some had criteria for which there was no supporting activity. An example of this is a criteria for CO2 reduction without providing tools and support to help entrepreneurs continue to reduce their CO2.

Conclusion

This research added to the limited body of knowledge about sustainability in entrepreneurship ecosystems in Rwanda and Kenya. It also produced a novel framework for evaluating hub impact to triple bottom line sustainability. A full account of the research process and outcomes is in Part 2.

The main goal of this research was to provide inspiration and criteria to design a solution to help hubs, and ASME specifically, increase the impact of its innovation programs. To that end, the key insights from each research question are summarized below.

Section 1: What influences sustainability in entrepreneurship ecosystems?

- Hubs can impact ecosystem sustainability through their support services, social network, and culture
- Opportunities to increase the sustainability orientation of the Rwandan and Kenyan ecosystems include:
  - Facilitating a sustainability oriented support pipeline
  - Showing the economic value of social entrepreneurship
  - Teach social and environmental impact tools for technology

Section 2: Who are the stakeholders in the entrepreneurship ecosystem?

- Tensions in stakeholder interactions need to be considered in the design.
  - Failure is not seen as an acceptable outcome of entrepreneurship
  - Hubs need to balance hub activities with business development time for entrepreneurs
- Some needs and opportunities within the ecosystem were identified.

Hubs

- Securing funding and critical resources is a top hub concern
- Hubs can formalize and strengthen relationships with academia and industry. NGOs are also good resources for subject matter expertise
- Hubs are shifting from being solely entrepreneurship support organizations to offering other revenue generating services

Entrepreneurs

- Entrepreneurs need guidance in creating organizational structures for scale
- Entrepreneurs need practical frameworks to help them integrate environmental sustainability and a social mission into their businesses profitably
- Hubs can also benefit from these frameworks

Section 3: How do hubs currently practice triple bottom line sustainability?

- Hubs vary widely in their focus, structure, and mission. Hubs currently practice sustainability by:
  - Practicing and teaching design thinking to ensure desirable products (economic)
  - Considering the location of their programs to provide access to more people (social)
  - Implementing clean energy systems and creative ways to reuse furniture (environmental)
- Investigating hub programs revealed the following ways they can improve.
  - Hubs can improve impact by leveraging existing stakeholders in different parts of their programs
  - Hubs should consider more efficient ways sharing of information
  - Hubs can increase their impact by reconsidering the tools they use
  - Hubs recognizing opportunities to practice sustainability improves their motivation

Chapter 2: Define Design Vision & Challenge

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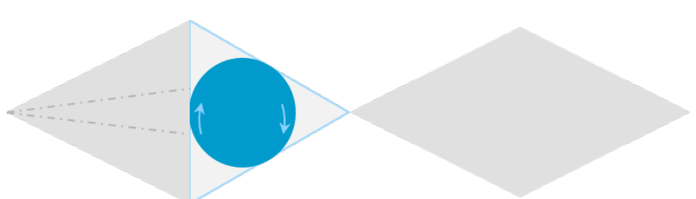


This chapter details the strategic vision that motivated the design. It also explains the co-evolution process used to go from this vision to a design challenge with criteria drawn from the research stakeholder research and hub best practices.

Key Insights for Design

Design Vision- Cultivating Ecosystem Sustainability

Design Challenge- *How to design an approach (tool, process, or method) to help hubs increase their impact on triple bottom line sustainability*

Table 2.1 Design criteria used for the Project

Design Criteria
Support social impact knowledge and skills
Support environmental impact knowledge and skills
Identify new ways to use existing hub resources OR Identify stakeholders to provide potential resources
Identify ways for hub to create impact directly
Flexible
Identify opportunity to strengthen interactions
Minimize entrepreneur based metrics
Have an offline version

Introduction

ASME's initial challenge for this project was how to scale the sustainable impact of their current accelerator program, ISHOW. Because of this, inspiration for the vision was drawn from the ways hubs can impact an ecosystem.

The Vision

The ecosystem factors- social network, support services, and culture- served as a filter to provide a hub perspective for the themes and practices identified in the research. Through this filter, stakeholder themes and hub best practices from research inspired the strategic vision-
Cultivating Ecosystem Sustainability.

This vision extends the range of people ASME can impact. Currently, ASME creates and measures its impact through the entrepreneurs it supports. Expanding this focus of sustainability impact from entrepreneurs to ASME's whole network and ecosystem allows for a broader range of potential impact.

The following sections envision ecosystem networks, hub culture and services in the context of cultivating ecosystem.

Culture

The vision for culture focuses on hub practices- within and beyond their role in startup support.

Within- Hubs create policies within their operations and programs based on environmental and social responsibility. These policies leverage best practices, including considering locations for programs and rethinking resource usage. These practices invite entrepreneurs to seek triple bottom line sustainability in their businesses. This is visible in their business models, value chain partnerships, and even their electricity management.

Beyond- Hubs show the economic value of incorporating social and environmental responsibility through revenue-generating services. Offering community courses, events, or consulting services that make money and positive change provides examples of social entrepreneurship to the ecosystem and adds to the reputation of the hub as an authority on impact innovation.

Inspired by

- Understanding and Creating Entrepreneurial Culture (theme)
- Hubs impact beyond startups (theme)
- Hubs build credibility (theme)
- Show value of sustainability (Opportunity-Ecosystem Factors)
- Hub best practices

Network

The network vision focuses on efficiently leveraging ecosystem expertise within the hub. Stakeholders from academia, industry, and NGOs partner with hubs to determine ways to share their expertise broadly. Hub employees will also be sustainability advocates and share their experience of innovating around societal challenges or using approaches considering the triple bottom line.

Inspired by

- Opportunities for partnerships to add more value (theme)
- Strengthen interactions with academia and industry (stakeholder observation)

Services

The vision for support services is to provide entrepreneurs with tools and strategies that help to address the specific challenges of running a business that seeks more than profit. These include how to develop an impact story and metrics, taught by KCIC, or create an environmental sustainability roadmap, taught by ISHOW.

Inspired by

- Challenge to attain Social impact and growth (theme)
- I want to know and do more Environmentally (theme)

Co-evolution of Design Challenge and Solution

Cultivating ecosystem sustainability provided a broad design space. Within it, ideas such as designing a program to help entrepreneurs use sustainability tools and creating a forum for sustainability advocates in the ecosystem both satisfy the vision equally. The co-evolution design method (Dorst 2011) was used to narrow the design space further. An ideation and selection process provided clarity on both the challenge and the solution space.

Ideation Method

Ideation was conducted in parallel to defining design requirements. Executing the process this way served two purposes. First, this method refined the design vision to a clear design challenge. Second, ideation at this point allowed me to re-engage stakeholders to get feedback on potential design ideas while still in the field.

This ideation exercise used the value mapping tool created by Bocken et al. (2013). The value map allows for ideation that has both company focus and ecosystem considerations (Figure 2.1). This dual perspective of the tool fits the need to design a way to cultivate ecosystem sustainability which ASME can implement as a hub operator. The value map was used in two co-creation sessions: one with ASME representatives and one with a group of international students. Students within the

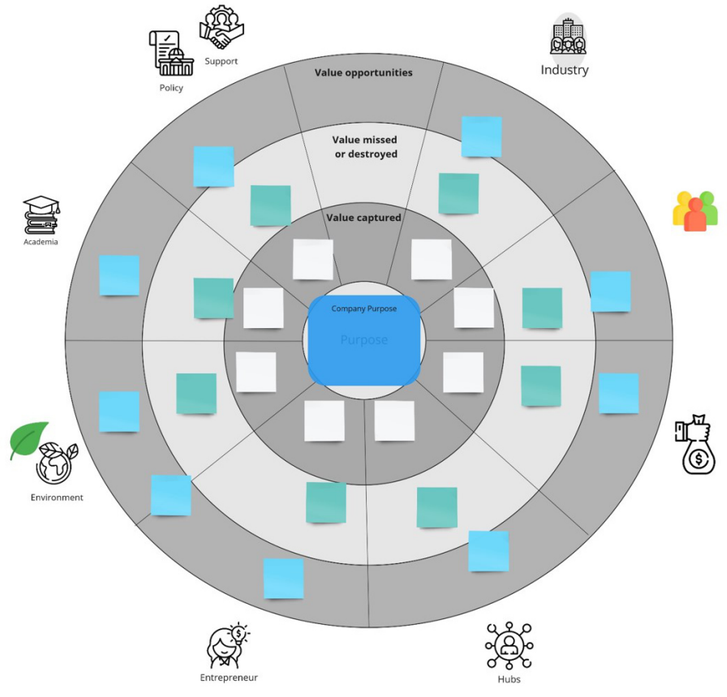


Figure 2.1 Value Map used in Ideation (Bockent et al, 2013)

Table 2.2 *Summary of Ideation Output for Each Hub*

Hub	Location	Profile	Opportunities Generated
ISHOW	Regional	Social & Environmental Impact	22
KCIC	Kenya	Environmental Impact	14
RP	Rwanda	Academic	9
250Startups	Rwanda	Tech	16

group had experience as entrepreneurs, hub participants, academic lecturers, investors, and industry employees. This experience matched several stakeholder groups represented within the value map.

The procedure prescribed by Bocken (2013) was followed in all sessions. First, the purpose and the 'value created' circles were prepopulated based on the information gathered from hub interviews. Then, within the co-creation session, each ring was filled in, one stakeholder at a time, moving from 'value missed' to 'value opportunities.'

These co-creation sessions resulted in four completed value maps which then went through a filtering and selection process.

The hubs were selected to represent social impact, technology, and an academic hub as well as represent all locations

Selection Process

The selection process (*Figure 2.2*) followed seven steps to translate the opportunities into a design challenge.

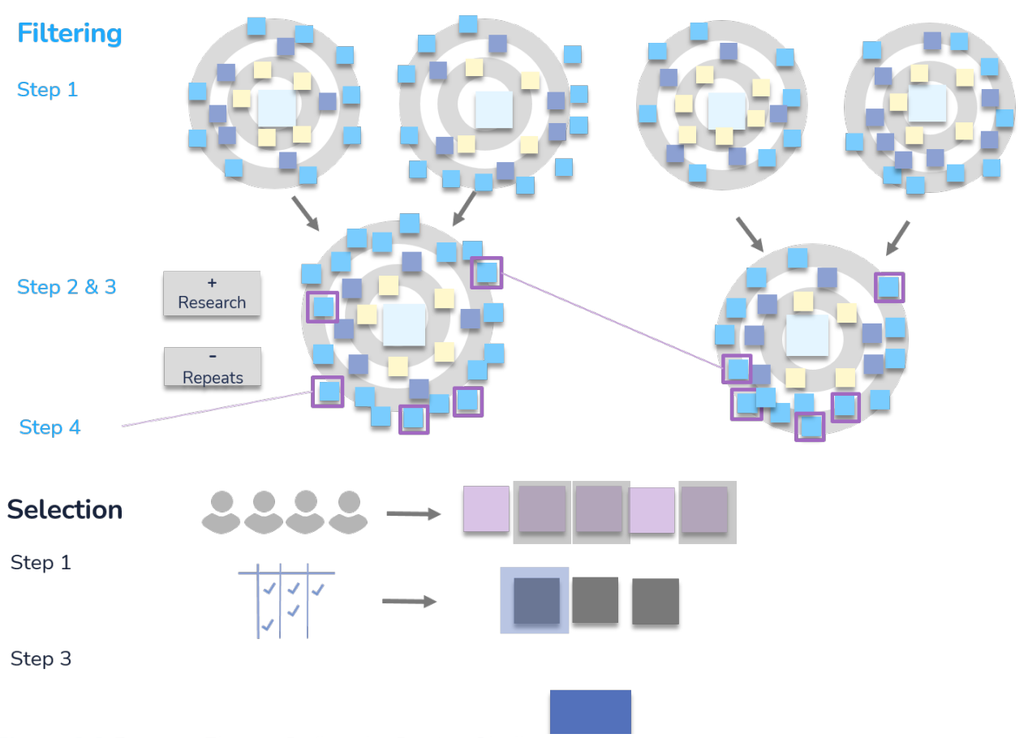


Figure 2.2 *Process Flow to Define the Design Challenge*

Filtering

1. Combine the "Value opportunities" of sustainability profiled hubs ASME, KCIC, and non-profiled hubs, RP and 250startups
2. Add opportunities identified in early research to the appropriate summary (Ex. "Incorporating sustainability in tech)
3. Remove repeat ideas within each summary
4. Identify common opportunities between the sustainability profiled hub summary and non-profiled hub summary

Selection

1. Solicit stakeholder feedback on ideas (hubs, academia, industry, hub network)
2. Elaborate promising ideas
3. Evaluate based on sustainability impact, hub factors, scope (Table XX)
4. Define the design challenge

Three opportunities were selected after stakeholder feedback. These ideas were evaluated based on the elements of the vision: increasing impact, improving services, culture, and networks (*Table 2.3*). An additional criteria of scope was added to ensure the selected idea could be implemented as a first horizon within the vision.

1. Resource Swap/ Match- an event or service to help identify people with specific expertise to teach in hub programs. In a swap, the hub could offer a similar workshop to the school, hub, business or NGO
2. Entrepreneurship Pipeline- a service or event to connect industry, academia, and hubs. The service would provide a place where students can find projects, internships or jobs among startups and industry. Industry, academia, and hubs provide expertise to each other to support the innovation projects, students and startups.
3. Sustainability tool- a service or tool to help businesses build strong relationships and save money by incorporating

Table 2.3 Evaluation of Most Desirable Opportunities

	Sustainability Tool	Resource Match	Entrepreneurship Pipeline
Increases Impact	++	+	+
Improve Support Services	+	+	+
Build Sustainability Culture	+	0	++
Build Network Strength	0	+	+
Less than 1 year to implement	+	-	--
Total	5	3	4

environmental and social practices within the company.

Focusing the vision

Evaluating these ideas also led to refocusing the vision. This refocusing included considering a shift in perspectives. First, the focus is on the hub perspective (Me) before broadening to consider the stakeholders of interest- academia, industry, (We).

Cultivating ecosystem sustainability: Me and We

Me: This part focuses on the aspects of support services and hub culture previously described. It looks at how hubs can integrate sustainability into their practices and teachings and how this can impact the environment within the hub. The network plays a part through the consideration of services and culture.

We: In this part of the vision, cultivating a triple bottom line knowledge and advocacy network is central. This network will apply the triple bottom line pillars of economic, environmental, and social considerations within innovation and entrepreneurship. Creating, using, and sharing expertise will be one focus. The other focus will be growing a pipeline and community of practitioners to build existing communities.

In this part, hubs will continue building expertise and credibility as teachers and practitioners of the triple bottom line from the first part of the vision.

Adding an initial horizon to the vision focused on hubs cultivating ecosystem sustainability led to the design challenge.

Design Challenge

How to design an approach (tool, process, or method) to help hubs increase their impact on triple bottom line sustainability

The purpose of this approach would be to help hubs use their resources to have a more significant impact on their social, environmental, and economic goals. By specifying an approach, solving this challenge helps hubs to continuously improve their programs.

For this purpose, specific themes and challenges from the research were reinterpreted to create a program of criteria (*Table 2.4*).

The criteria cover three main design areas: generating impact, engaging stakeholders, and satisfying hub needs. The criteria for identifying stakeholders as new resources and using existing hub resources were interchangeable because they both reduced the financial barrier to implementing changes.

These criteria guided the development of a toolkit Chapter 3.

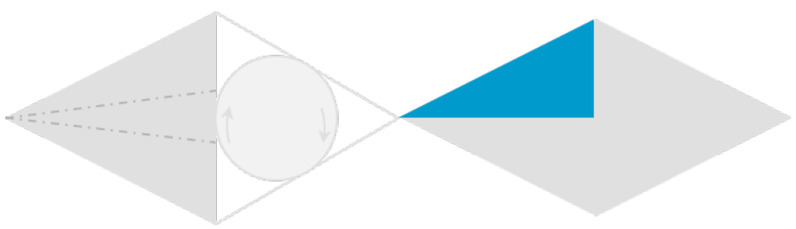
While the ideas for Resource match and entrepreneurship pipeline were not selected, they showed potential next steps. Because of this, these ideas became part of the strategic vision in Chapter 4

Table 2.4 List of Design Criteria and Inspiration from Research

	Reference	Design Inspiration	Desired Function
Desirability	Theme- Challenge to attain Social impact and growth	Challenge to attain Social impact and growth	Helps hubs support entrepreneurs in creating social impact
	Theme- I want to know and do more Eco in my business	I want to know and do more Eco in my business	Helps hubs support entrepreneurs in creating environmental impact
	Theme- Hub Themes & Priorities	Hubs Impacting beyond Startups	Identify ways for hub to create impact directly
Viability	Theme- Generating and Finding Funding	Hubs struggle and seek funding (resources)	Identify new ways to use existing hub resources
	Theme- Opportunities to add value through partnerships	Partnerships Add value	OR Identify stakeholders to provide potential resources
	Stakholder interactions map	Opportunity to strengthen interactions (esp academia and industry)	Identify opportunity to strengthen interactions
Feasibility	Observation- Hub Practices & Impact	Hubs vary widely in their focus, structure, and mission	Flexible- support different program structures and industries of focus
	Theme- Tensions	Hub Work Impeding Business Activities	Minimize entrepreneur based metrics
	Ecosystem Factors	Both governments are working to strengthen ICT infrastructure	Have an offline version

Chapter 3: Concept Development

Chapter Contents



Based on the design challenge, the Step up Sustainability toolkit was created. The toolkit consists of two tools: the Sustainability Journey and a redesigned version of the sustainable business model pilot canvas (Baldassarre et al., 2020). The toolkit helps to increase impact by:

Identifying ways to modify the existing program to address sustainability goals
Inspiring new activities to increase hub impact on sustainability
Detailing resources, timing, and metrics to implement each new idea into the hub program
The following steps were followed to arrive at this design (*Figure 3.1*). This chapter explains the final solution and the process used to derive it from the design challenge.

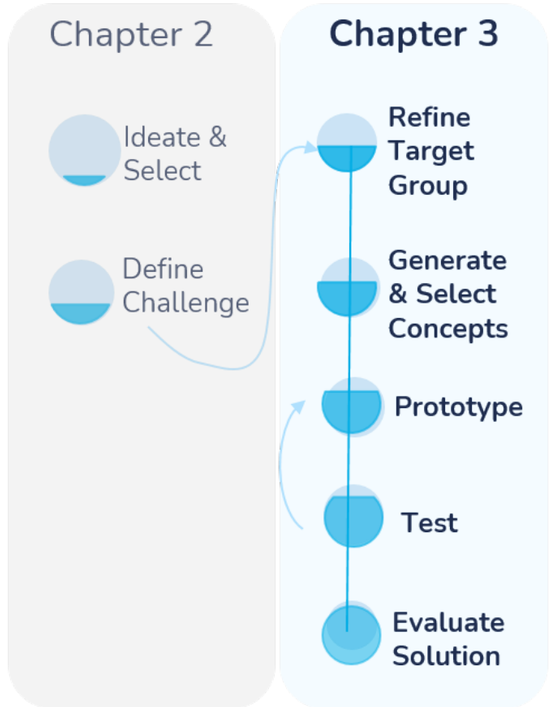


Figure 3.1 Diagram of the Concept Development Process

Design Process

Target Group

This design challenge focused on developing a solution for social and environmental impact-focused hubs in East Africa. Previous research identified hub variables of industry focus, sustainability profile, and support type as considerations for a design solution. Conversations with prospective test participants added hub experience and capacity for change as essential considerations. Capacity for change refers to the ability and motivation the hub has to consider program and process changes. This capacity may differ over time based on the cycle of a hub's strategic reviews and changes in the ecosystem. It may also differ based on the hub workload. Based on this, personas were constructed based on four segments of social impact hubs (Appendix). The Improvers persona aligns with the needs and motivations of the target group for this tool (Figure 3.2).

"Improvers"

"We've seen the need across Africa. The question is how do we scale to meet that need effectively?"

Goal: Create more impact with their resources.

Motivations
- Doing more for the communities and entrepreneurs they support
- Reaching new people and locations

Needs and Challenges
- Identifying resources to support new initiatives
- Growing and scaling current programs to reach more people
- Addressing new needs in areas related to their current program

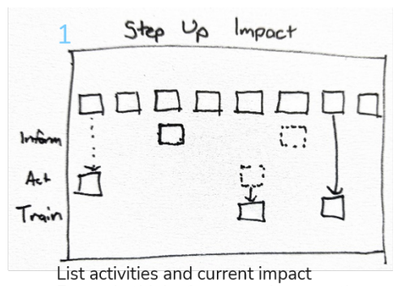
Moderate Experience | Curious | Growth Mindset

Figure 3.2 Improvers Persona

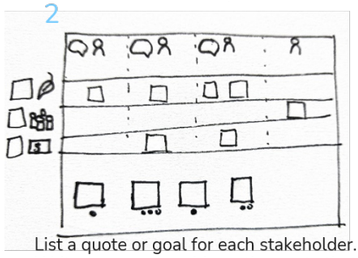
Concept Ideation and Selection

Initial ideation for the tool for Improvers centered around using the elements in the journey used for analysis to design a tool to help hubs increase their sustainable impact. Inspiration was also drawn from standard journey maps and the value map tool. Solution ideas were generated (*Figure 3.3*) to understand ways to improve and extend the current program with new ideas.

Idea three was selected because it was the only one that met all criteria. This idea was developed further by introducing reflection questions and prototyping a layout.



List activities and current impact
For each, think of a way to increase the impact level



List a quote or goal for each stakeholder. Write one way to address the quote that impacts each sustainability pillar. Then

List a stakeholder goal related to one of the pillars. Write an activity idea to address that goal. Write an idea for each

Figure 3.3 Initial Ideas for Tool

Table 3.1 Evalution of Initial Ideas

Design Criteria	1	2	3
Helps hubs support entrepreneurs in creating social impact		✓	✓
Helps hubs support entrepreneurs in creating environmental impact		✓	✓
Identify new ways to use existing hub resources OR Identify stakeholders to provide potential resources	✓	✓	✓
Identify ways for hub to create impact directly	✓		✓
Flexible	✓	✓	✓
Identify opportunity to strengthen interactions		✓	✓
Minimize entrepreneur based metrics	✓	✓	✓
Have an offline version	✓	✓	✓

Concept Iteration

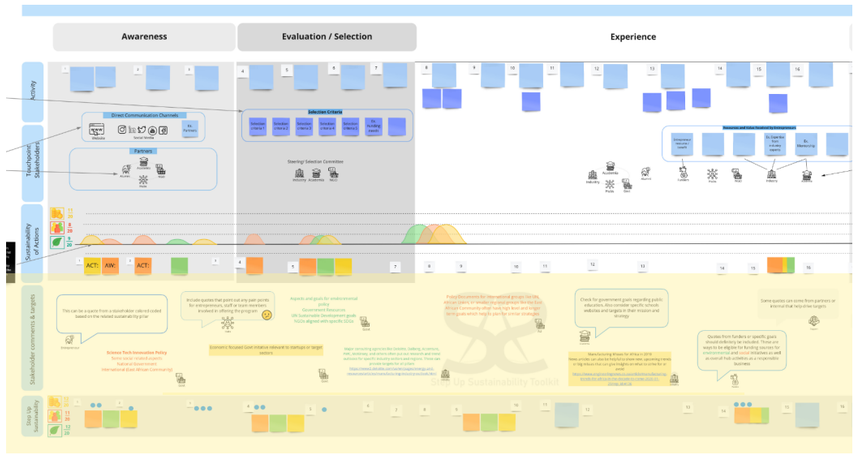
Two revisions of a sustainability tool were prototyped and tested according to the criteria. After each test, participants were provided a checklist of criteria to determine whether the tool performed as designed. Participants also commented on the tool output and process (*Table 3.2)*.

User Test One. The concept successfully drove improvements in the first test but needed structure to improve usability. The usability issue came from the complexity of integrating three dimensions into one tool: impact level, sustainability pillar, and stakeholder identification. Identifying potential partners required going to a more detailed level. A tool appropriate for that level of detail could also help clarify the resources needed for a potential activity and actual impact. These considerations led to including the Sustainable Business Model Pilot Canvas as part of the toolkit.

.Iteration Two. An additional round of ideation was done to experiment with the integration of reflection questions, different sections, and layouts in light of the addition of the pilot canvas *(Appendix*).

In the second round, testing focused on the revised portion of the tool, the idea generation portion (highlighted in *Table 3.2*). This revised section was incorporated with the rest of the tool in the final revision and layout. All three versions of the tool are included in the Appendix.

Table 3.2 Summary of Journey Revisions



Revision	Initial Prototype	Version 2
Test Goal Test Setup	Test full journey tool • One user, Self guided completion on Miro (~2 hours)	Test revised idea generation section • Facilitated session with a group of five on Miro (~45 minutes)
What didn't work	• "Hard to adapt to how our hub works" • "The stakeholder goals section was particularly confusing" • "Feels best as an interactive activity with a facilitator"	
What worked	• "I'd use it after every program completion... It could be really helpful for reporting to our funders" • "It could be helpful for the implementing partners we work with in mapping their programs" ✓ Triggered reflection on current interactions ✓ Identified ways to use existing hub resources ✓ Identified ways for hub to create impact directly, as opposed to through entrepreneurs ✓ Helped improve impact ✓ Helped improve impact to all pillars (environmental, social) ✓ Generated improvements/ ideas for our focus area / industry	"I'm really happy with the ideas that came out of this" "This would be great as a post mortem tool after each program" ✓ Identified ways to use existing hub resources ✓ Identified ways for hub to create impact directly ✓ Generated ideas to support skills in creating social impact ✓ Generated ideas to support skills in environmental impact ✓ Generated improvements/ ideas for our focus area / industry
Changes for next revision	- Refine target group - Add list of activities for each impact level - Simplify idea generation from stakeholder based to sustainability pillar based - Make the reflection questions interactive	- Update layout and flow - Integrate new section with existing tool

Iterating the Pilot Canvas

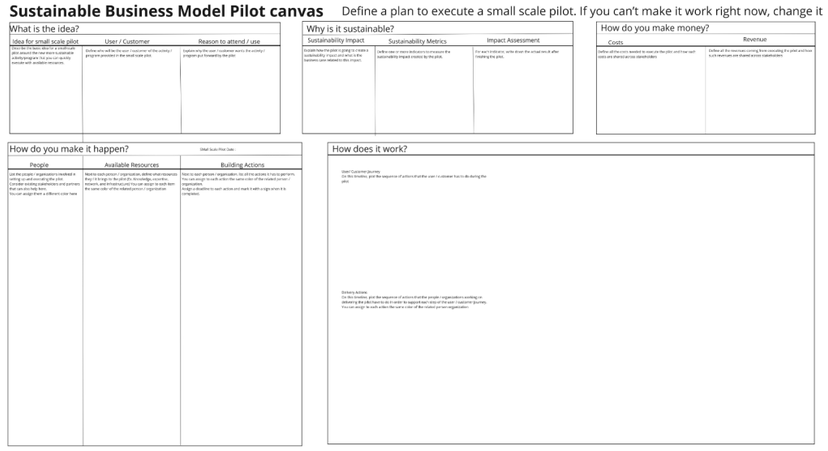
The toolkit includes the Sustainable Business Model Pilot Canvas. The canvas was included to provide a place to name potential partners and list required resources for an idea at a detailed level. Doing so drives action after completing the sustainability journey by creating a detailed plan.

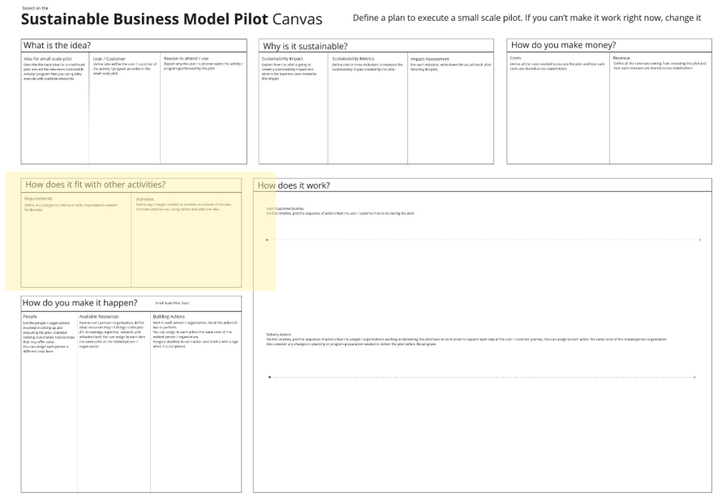
The pilot canvas is a redesigned form of the sustainable business model canvas created by Baldassarre et al. (2020). The goal is to get quick feedback on an idea to allow fast improvement instead of detailed planning and cost for an untested idea. This feature addresses the design criteria for optimizing existing hub resources.

The pilot canvas was also tested and revised. *Table 3.3* gives a summary of the test, feedback, and changes made between the first and final revisions. The "Toolkit in action" section describes the test process how these changes improved the canvas and the output.

After completing the user tests, the toolkit prototype was finalized .

Table 3.3 Summary of Pilot Canvas Revisions





Revision	Published Layout	Version 2
Test Goal Test Setup	Understand utility of canvas to meet design criteria • Self guided completion by 2 users on Miro • Feedback session with contributor and supervisor (completed)	Feedback session with contributor and supervisor
What didn't work	"It's not clear how this program activity integrates with the others"	
What worked	"It would be good to see how this affects program preparation" ✓ Identified ways to use existing hub resources ✓ Identify stakeholders to provide potential resources ✓ Minimizes additional reporting from entrepreneurs - Connects impact potential to impact metrics as part of pilot completion	"This is great. This is what I was looking for to move forward" ✓ Identified ways to use existing hub resources ✓ Identify stakeholders to provide potential resources ✓ Minimizes additional reporting from entrepreneurs Connects impact potential to impact metrics as part of pilot completion
Changes for next revision	- Add section focused on integration of new ideas within the existing program (feasibility) - Add note to consider planning activities in addition to execution activities - Change layout to A3	

Final Prototype

Sustainability Journey

The Sustainability journey contains two main boards: a journey board and a discussion board (Figure 3.4). The journey board visualizes the hub program, impact goals for each pillar, and the final list of impact ideas. The discussion board guides users through reflections on most journey elements to identify improvements.

Using the Sustainability Journey

The Journey board contains seven sections, for which there are five matching sections on the Discussion board and one on the Prioritizing Ideas board. This process explains how these sections are used. It is also explained and visualized in a video.

https://youtu.be/yM3xkBCtIiY

1. Goals and Trends- The facilitated session starts with the team brainstorming trends and ecosystem goals for each sustainability pillar (discussion). The team revises, or creates, program goals that these trends into account (journey). This step creates up-to-date impact goals to drive the rest of the process.
2. Activities- The team fills in program delivery activities (journey). These are the steps from marketing a program, through program completion, to, finally, how the hub reaches out to program alums.
3. Activity Impact- The team evaluates each activity on how it accomplishes an impact goal (journey). The impact level and sustainability pillar are considered. Those steps that don't address a goal become options for improvement(discussion). The team revises each of these activities to make it address an impact goal. The materials section contains a list of common hub activities for each level.

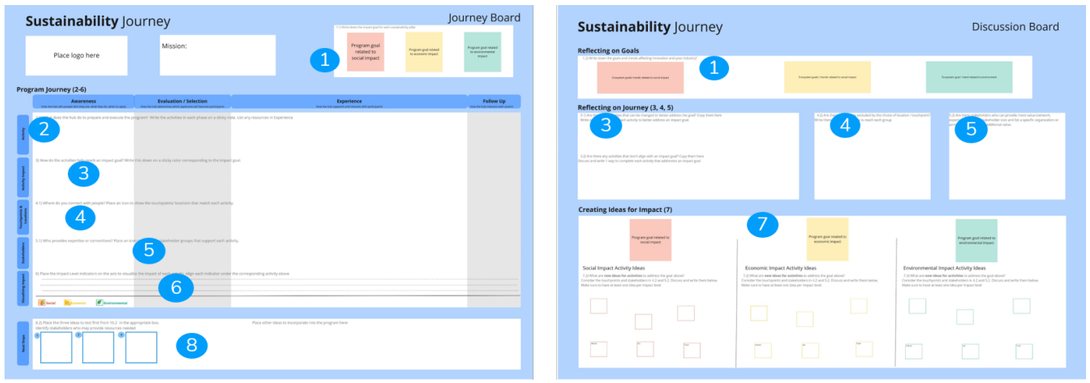


Figure 3.4: Sustainability Journey- Journey (left) and Discussion board (right)

There are three impact levels- inform, act, and train, in increasing order of impact. These correspond to the Education, Modelling, and Training behavior change interventions, respectively, according to the COM-B model (Mayne 2017). Chapter 8 details how this impact assessment was created.

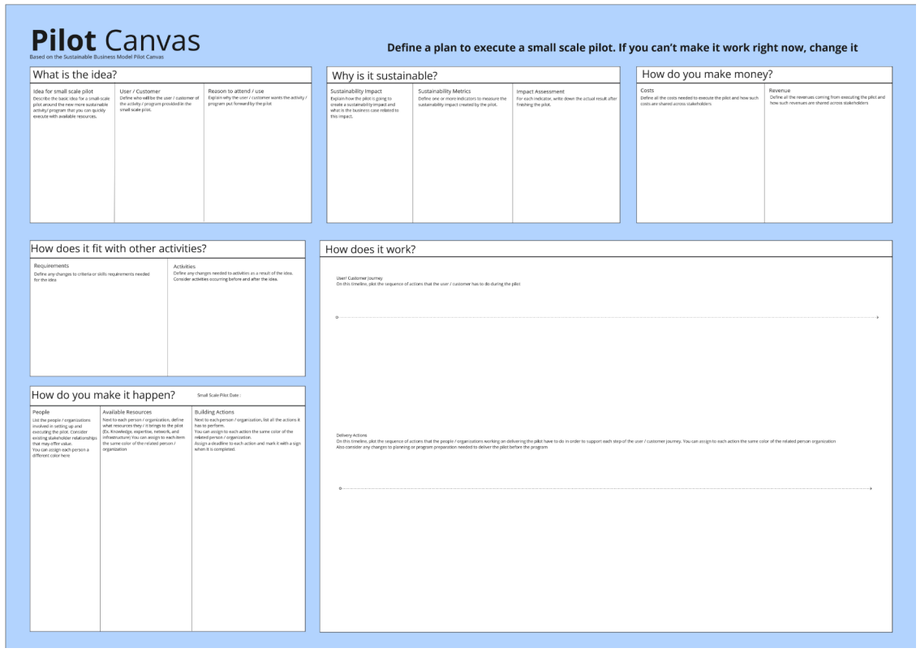
4. Touchpoints and Locations- The team lists the touchpoints used at each step (journey). These are discussed to determine if they are inclusive and targeting the correct entrepreneurs.
5. Stakeholders- After listing the stakeholders for each activity (journey), the team discusses stakeholders who may be able to provide additional expertise the hub needs.
6. Visualizing Impact- The impact of each activity is visualized to show which pillars to focus on when brainstorming new ideas (journey). Pre-made and labeled graph elements are included in the Materials section.
7. Creating Ideas for Impact (Discussion)- Once the program is visualized, the toolkit guides the teams to brainstorm new ideas to address the goals completely. Any parts of a goal which were not previously achieved are the focus of this step. In addition to open brainstorming, teams must identify at least one idea per impact level for each sustainability pillar.
8. Next Steps- The team ranks all ideas based on their potential impact and the implementation time needed in the Prioritizing Ideas board. They add ideas to any time scale that lacks sufficient ideas. Three ideas are chosen as the first ones to test and implement. These and all remaining ideas are placed, in order, on the journey.

Evaluation Against Criteria

The sustainability journey was designed to meet all the established criteria in a clear, engaging way. Table 3.4 shows where elements of the tool addressed each criteria.

Table 3.4: *Evaluation of Sustainability Journey*

	Desired Function	Design Feature
Desirability	Helps hubs support entrepreneurs in creating social impact	Step 7.1- This guides hubs to generate ideas to add more social sustainability elements including in activities that "inform" and "train". Hub practices and "act" activities can also provide an example of how social impact hubs balance an economic and social mission.
	Helps hubs support entrepreneurs in creating environmental impact	Step 7.3- This section guides hubs to generate ideas to add more environmental sustainability elements including in activities that "inform" and "train"
	Identify ways for hub to create impact directly	Step 3 and 7- Act Impact level considers direct impact of hub activities; Step 7 inspires new activities for direct hub impact Sustainability section of canvas identifies specific metrics to connect impact metrics to impact potential.
Viability	Identify new ways to use existing hub resources	Step 3-5 The journey helps to generate to allow reuse of program content and to extend existing relationships.
	OR Identify stakeholders to provide potential resources	N/A- Canvas
	Identify opportunity to strengthen interactions	Step 5.2 triggers reflection on specific interactions that could offer more value
Feasibility	Flexible- support different program structures and industries of focus	Step 1 Goals- The output is tailored to industry or focus area through the selection of trends and writing the impact goals.
	Minimize entrepreneur based metrics	Step 3 & 6- Activity impact section evaluates the impact potential of activities without requiring additional entrepreneur input. Final assessment of impact can occur within current evaluation processes
	Have an offline version	All tool templates were designed to allow printing on A3 paper



| Figure 3.5- Final Prototype of the Pilot Canvas

Pilot Canvas

The final pilot canvas prototype helps hubs identify partners, resources, and a pilot plan to accelerate feedback on a new idea. In addition, a pilot requires less investment than detailed planning and cost for implementing an untested idea. This aspect is another way the toolkit helps hubs identify and optimize resources.

Parts of the Pilot Canvas

Users complete each of six sections to draft their pilot plan (Figure 3.5).

What is the idea- In this section, hubs consider the desirability of the idea considering the users and their motivation.

Why is it sustainable- This section considers the idea's sustainability, including metrics to determine impact after program completion. These metrics relate impact potential to actual impact for all three impact criteria. This section also guides hubs to name impact metrics that minimize entrepreneur effort.

How do you make money- This section addresses the idea's viability, including revenue and costs.

How does it fit with other activities- This section was added based on feedback during testing. Because the ideas represent activities or offerings within a program, hubs must ensure a fit between the new activity and the existing program. Also, adding a new idea may impact other activities in a program where activities occur sequentially.

How do you make it happen- The team lists the necessary people and resources to conduct the pilot, along with each person's role. This feature aligns with the criteria "Identify stakeholders to provide potential resources."

How does it work- This final section details the feasibility by mapping out all the steps needed to execute the pilot test. In addition, it contains places for delivery activities and user experience.

| Table 3.5 Pilot Evaluation

Desired Function	Design Feature
Identify new ways to use existing hub resources	The canvas emphasizes making choices to allow the pilot to happen now. This pushes the team to identify partners, content, and resources that they have access to already
Identify stakeholders to provide potential resources	"*How do you make it happen*" section helps identify expertise and a specific person
Flexible- support different program structures and industries of focus	The overall tool was designed for use by any business or organization. There are no industry or business model specific questions or elements
Minimize entrepreneur based metrics	"*Why is it sustainable*" section allows metrics to be selected. Hub can choose to collect this data with existing measurements

Evaluation Against Criteria

The pilot canvas meets four of the criteria (Table 3.5). Together, the toolkit meets all design criteria.

The criteria used to guide the design process align with the Desirability, Viability and Feasibility framework (Table 3.4). In addition, the toolkit accomplishes the following project level goals:

- Allow ASME to increase the impact of ISHOW and IdeaLab programs. Testers and interviewees want to use the tool (desirable)
- Creates a toolkit that ASME can add to its Impact Services (viable)
- The toolkit only requires confirmation of the final form in a complete session. This can be tested internally on ASME's IdeaLab program (feasible)

The Toolkit in Action

While using the toolkit to evaluate a hub program, one improvement idea was selected.

The current program contains a regional portion with 24 participants, followed by a global portion with nine of those participants. Within the global cohort, they conduct a sustainability workshop that trains entrepreneurs to create sustainability roadmaps for their businesses. The Sustainability Journey identified the improvement of shifting this workshop to the regional portion to include more entrepreneurs.

This idea was selected to use within the pilot canvas.

The pilot workshop was shortened to two of the four training modules in line with the canvas's charge to change any pilot that cannot be completed now. In addition, the canvas helped identify organizational resources that could help deliver the pilot in a hybrid form. This department also has the potential to become a recurring partner of the program.

A review of the completed pilot canvas identified the need to add a section that assessed the fit of an idea within the program. Adding this section clarified that the global version of the workshop would become a check-in and troubleshooting session. This change to the global workshop also increased impact by supporting entrepreneurs in implementing their roadmaps instead of just the design. In the end, the hub had a complete plan to execute the pilot. This plan included a timeline that included the new workshop into the program preparation schedule.

Conclusion

The Step up Sustainability toolkit provides three lenses for hubs: social, environmental, and economic impact. With these, teams review their current programs for impact and improvement opportunities. They also use these lenses to create new ideas. The two-part ideation process identifies both quick wins and longer-term improvements for a more significant impact. Then, the pilot canvas turns these ideas into manageable and measurable impact plans. Together, they achieve the goal of helping hubs increase their impact by improving their support services and creating an impact-oriented culture.

Chapter 4: Develop Roadmap

Chapter Contents

This chapter explains the steps within a roadmap to cultivate ecosystem sustainability by creating a platform. The Capacity linking platform, Clink, was designed based on the elements of the vision drawn from stakeholder insights (Figure 4.1). It incorporates early ideas from Chapter 2 that align with ASME's strengths. The roadmap gives three horizons for creating and sharing expertise to reach the vision in the fiscal year 2027.

Horizon 1 FY 2023- Implement the Step up Sustainability toolkit to facilitate sustainability culture one hub at a time

Horizon 2 FY 2025- Implement Information resources, Clink Chat events, and a People Connector service to grow the impact ecosystem capacity through collaboration

Horizon 3 FY 2027- Implement a Pipeline Connector service to drive sustainability for all through innovation pipeline building

"[Corporates should] **Partner with** entities that understand **innovation** and have been in that game for some time" - Dr. Joseph Sevilla Strathmore Univ. iLab

Academia

"[Making collaboration concrete] It's a good idea. It always happens like that. We say 'yes, it's good for us to work together' and then we go home."- Professor, Kenyatta University

"I'm hoping this becomes a trend where **more corporates work with startups** in Kenya"- SNDBX

Industry

"**We need startups** to help us speed up" - Kenya Airways

Entrepreneur

"Mentorship is not enough; **network and connections** are necessary **to get to the next level** [from startup to mature business]" Founder, Rwanda

Figure 4.1 Clink Platform homepage

Horizon 1

The first horizon of the vision centers on implementing the Step up Sustainability toolkit (Chapter 3). The final iteration of the toolkit is designed as part of a facilitated service. After having an initial session facilitated, hubs have expressed interest in continuing to use the tool after each program. These sessions would be self-facilitated. The shift from a facilitated session to self-service creates new needs to provide some of the facilitators' input.

The additional needs for self-service toolkit include:

- Guidance on trends, regulations, and goals at the start of the process
- Suggestions for partners for new ideas

The first need relates to sharing information about sustainability which is relavant to the ecosystem. The second concerns identifying stakeholders with knowledge and motivation to engage in impact activities.

Creating solutions for these new needs adds value in two ways: it allows the toolkit to become a do-it-yourself service and builds toward the vision of cultivating ecosystem sustainability.

Develop: Roadmap

| *Figure 4.2: Roadmap to Cultivate Ecosystem Sustainability*

Horizon 2

Horizon two considers the needs which arose to allow self-service use of the toolkit. Three concepts were considered to facilitate this self-service and the transition from focusing on hub sustainability to ecosystem. As future activities for ASME, each concept is explained with its potential impact level considered.

Sustainability Information database

The Sustainability Information database directly supports the toolkit by providing links to websites, reports, and information about each sustainability pillar. In addition, this database offers a place for hubs, academia, and industry to seek, share, and discuss relevant research. In this way, it facilitates the Inform impact level within the ecosystem.

Identifying potential resources relates to the vision for the network. Two concepts were considered. One helps to incorporate sustainability into the new hub support networks. The second draws inspiration from the resource match idea (chapter 2), which scored well in this area.

Clink Connector (Resource Match)

The Connector feature of the Clink platform facilitates the exchange or linking of resource needs and expertise among ecosystem members (Figure 4.3). The Connector service will collect needs and improvement goals reported by hubs to link them to other hubs that can help. In doing so, the Connector identifies experts to help hubs with the Inform and Train activities.

The following iteration of the Connector service would include lecturers and researchers from academia and industry, respectively. By creating a knowledge community, each stakeholder group grows its specialized expertise while supporting the ecosystem (Hernández and Carrà 2016).

Figure 4.3: Value exchange among stakeholders for the Clink People Connector

Furthermore, any one stakeholder needs to develop their knowledge less than they otherwise would need to.

Clink Chats

Clink Chats are meetings that happen once per quarter. They feature one sustainability pillar as the topic of each meeting. As the level of knowledge within the ecosystem grows, the meetings can consider the intersection of a particular pillar and an industry sector or a specific area within a pillar- for example, one sustainable development goal.

Inform. The presentations in the meeting inform attendees of the particular topic and its relevance to innovation. These create awareness of the topic and motivate attendees to visit Clink and use the Step up Sustainability toolkit.

Act. Attendees have a networking opportunity where they can offer their sustainability expertise to their peers. Hubs who are new to sustainability have the opportunity to act by using the Step up Sustainability Toolkit.

Educate. Speakers from within the hub network share actionable research and case studies or give mini-workshops. Hub teams can share their knowledge, skills, and strengths with the other attendees.

These meetings both point to the platform for more information and give people an alternative to reading and messaging online.

Connection to ASME

These three concepts align with current services within Engineering for Change (E4C), a close partner organization of ASME's Engineering Global Development team. Engineering for Change is a knowledge organization best known as a global platform offering training, resources, and community support. They focus on initiatives that accelerate the development of impactful solutions that improve the quality of life of underserved communities. These concepts would join the strengths of ISHOW and E4C to start to grow a sustainability-oriented community within the African entrepreneurship ecosystems.

Horizon 3

In the final horizon, the connections among academia, hubs, and industry are deepened through a single concept, Pipeline Connector. The Pipeline Connector was also considered among the early ideas (Chapter 2) and ranked highest in building culture. Within the roadmap, it builds on the service and network created in the People Connector in Horizon 2.

Pipeline Connector (Ecosystem Pipeline)

Once academia and industry connect to the ecosystem in horizon two, a subsequent service would allow these stakeholders to collaborate on projects and pipeline creation. This is what happens with the Pipeline Connector service.

The Pipeline connector utilizes hubs' networks and their strength as innovation experts. Pipeline Connector is the last horizon to provide time for hubs to incorporate social and environmental impact into their processes and tools. In this service, hubs' role in supporting and managing sustainable innovation projects for their entrepreneurs and industry will allow them to influence the impact of innovation across the ecosystem. Figure XX below shows the value exchange for the platform.

In addition to academia in industry, this concept further integrates hubs and hub networks. Within this model, hub networks like ASSEK and AfriLabs can help bring in hubs interested in participating. They can also provide connections to academia and industry that may not be connected with the impact innovation ecosystem.

Connection to ASME

ASME recently launched an incubator IdeaLab. Among IdeaLab's goals are to create a pipeline for ISHOW and to address the need for

Figure 4.4: Value exchange among stakeholders for the Clink Pipeline Connector

additional technical support in the early stages of venture development. The Pipeline Connector concept can inspire the development of IdeaLab and incorporate lessons from it. This connection to IdeaLab integrates and extends ASME's current initiatives within the vision scope.

Evaluating the Roadmap

Together, the concepts proposed within these horizons build on all the opportunities which inspired the vision to cultivate ecosystem sustainability (Table 4.1). In addition, the Appendix contains details of additional considerations regarding the Feasibility and viability of the concepts within the vision.

Addressing these opportunities achieves the vision and helps individuals and stakeholder groups to be more effective individually and as an ecosystem working to achieve social , environmental, and economic sustainability.

Conclusion

This roadmap illustrates how the Step up Sustainability toolkit can be integrated into the larger vision of cultivating ecosystem sustainability. The concepts within the horizons reinforce each other while building on the current initiatives and partnerships within ASME. Together they make cultivating ecosystem sustainability a tangible goal for ASME's Engineering Global Development.

Table 4.1: Assessment of Each Horizon Against the Vision

Vision Inspiration		Horizon 1	Horizon 2	Horizon 3	How the Concept Builds on the Inspiration
Culture	Understanding and Creating Entrepreneurial Culture	✓	✓	✓	The vision of Cultivating Ecosystem Sustainability comes to life by embedding social and environmental impact thinking into the culture of the ecosystem. Clink chats and Pipeline connector offer discussion and interaction opportunities. Discussion creates a common understanding of challenges, realities, and expectations of impact innovation in Rwanda and Kenya..
	Hub best practices	✓	✓		Hubs can share their best practices and experiences through Information Resources and Clink Chats
	Hubs build credibility	✓	✓		Through sharing best practices at Clink Chats and in articles, hubs can build their credibility. This becomes important for them to be able to take advantage of new consulting opportunities that come through the Connector services.
	Hubs impact beyond startups	✓	✓	✓	Participating in these services allows hubs to "Inform" and "Train" ecosystem stakeholders as innovation and subject matter experts
	Show value of sustainability		✓	✓	Clink Chats offer stakeholders, a place to share successes and benefits of operating as an impact focused business. Pipeline connector takes this further by involving students in sustainable innovation projects where they can experience impact entrepreneurship for themselves.
Network	Opportunities for partnerships to add more value	✓	✓	✓	Clink Chats and the Connector services help build networks within the ecosystem. They are particularly aimed at academia, industry and hubs as these are the knowledge centers within the ecosystem. At Clink Chats, people can explore who is interested in certain topics in a casual way. The Connector service helps identify specific experts
	Strengthen interactions with academia and industry	✓	✓	✓	
Support Services	Challenge to attain Social impact and growth	✓	✓	✓	Entrepreneurs are at the center of the ecosystem. As stakeholders start to interact more around social and environmental topics, entrepreneurs have more access to the knowledge and skills they need. This can be through papers, events, workshops (People), or participating in projects (Pipeline).
	I want to know and do more Environmentally	✓	✓		

Chapter 5: Deliver Implementation Plan

For this project, two deliverables were completed for ASME: the current state assessment of the entrepreneurship ecosystem and the Step up Sustainability toolkit. This chapter focuses on delivering these items, which address ASME's initial interests within the project.

- Understand the current entrepreneurship ecosystem
- Understand how to scale the sustainable impact of their entrepreneurship support programs

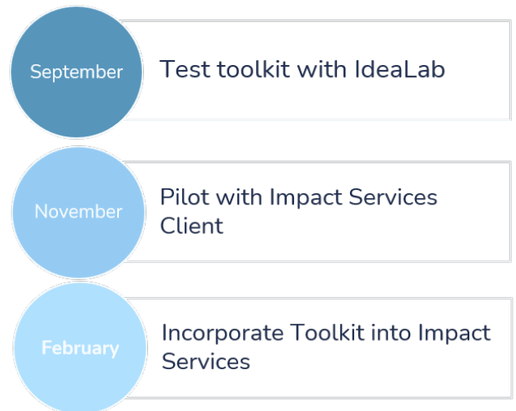
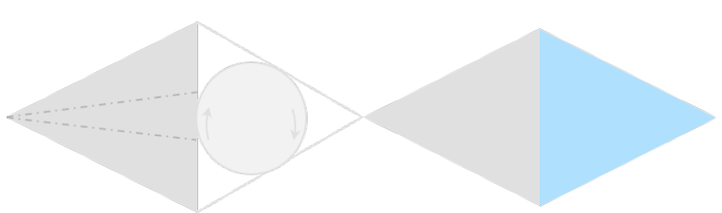


Figure 5.1- Step up Sustainability Toolkit Implementation Plan



Snapshot of the Current Entrepreneurship Ecosystem

Part 2 contains complete reports of the methods and results gained through the research at the beginning of this project. Apart from its use within the toolkit's design, ASME can use these insights to inform other parts of its Engineering Global Development strategy. For example, the stakeholder interactions map can help them identify which stakeholders to target in upcoming initiatives and how to engage them. Some of this work has already begun.

Summaries of the research were also shared with interviewees. These summaries included ecosystem and entrepreneur trends, hub best practices, and the summary value map of opportunities that matched the hub focus. In sharing these with the hubs, the interviewees received valuable insights in exchange for their time to support this project.

Step up Sustainability Implementation Plan

This implementation plan (*Figure 5.1*) was created with feedback to guide the ASME team in embedding the toolkit within their internal processes and Impact Services. ASME will execute the plan as it is out of this project's scope.

Internal Testing. The first step involves using the whole Step up Sustainability toolkit with ASME's recently launched IdeaLab incubator. This process will test the final version of the toolkit while familiarizing the Engineering Global Development team with the tool. The team was involved in creating the journey and the second user test; however, this trial allows a team member to gain experience facilitating a session with the tool. Following this internal test, any additional changes can be made to prepare the toolkit for use with clients.

Pilot the tool, The second step involves a pilot test with a client. This pilot would be an add-on service for an existing client. The goal is to develop the team's experience using the tool and validate the value proposition for the toolkit in a non-academic setting. The pilot also helps to generate additional testimonial feedback about the toolkit and its value.

Incorporate the Toolkit. The final step involves adding the toolkit as one of ASME's Impact Services. The toolkit can be included in the services offered to hubs and organizations seeking to improve their innovation programs.

Maintenance and Updates

Because the toolkit was designed for flexibility, it does not contain time-sensitive information which requires maintenance. In the future, the impact levels may need to be revised to match the common activities with hubs. However, this shift would be well-known to ASME and involve minor changes within the toolkit.

The final version of the toolkit was created in Miro. The ASME team and committees have the basic knowledge of Miro and design needed to update the tool.

The toolkit templates can be printed in an A3 format. This feature meets the requirement for having an offline version of the tool and allows ASME to use them in both online and in-person sessions.

Future Recommendations

Within the impact evaluation, another dimension to consider is the activity's reach. Reach refers to the number of people an activity intends to include. Adding this quantitative metric may provide value as another means of understanding the impact.

Several stakeholders suggested making a version of the toolkit for entrepreneurs. While considering this application was out of this project's scope, it could be valuable for ASME to explore. This adjustment would require a review of the impact levels to understand if the basis of behavior change theory still applies. It should also consider a landscape analysis to understand if this toolkit would offer unique value compared to existing sustainability-focused tools.

Design Conclusion and Reflection

Project Impact

While this project produced research insights and a toolkit for ASME, its main contribution of this project lies in its work to shift perspectives. During the research phase, this occurred while asking interviewees about the importance of social and environmental sustainability to them and how they practiced it. Some participants considered that these sustainability aspects applied only in certain situations. For example, environmental sustainability was important for considering packaging, agriculture, and traveling. However, the suggestion of other sustainable practices relevant to daily life, especially business, was met with surprise and interest in these cases. In these conversations, the interviewees shifted from ignorance of possibilities to the intention of acting on them.

This shift in perspective was the goal of the toolkit. By forcing hubs to consider each activity's triple bottom line impact, they would view each with a new perspective. This perspective could be taken with each team member and applied to life. If done so broadly, this helps individuals to see and act on the small things in their control to combat society's big issues like climate change and poverty. While this project certainly will not save the world, it did invite people to consider looking at their work in a way that can change it.

Contributions to Design and Future Work

The toolkit combined a new approach to a "journey map canvas" and behavior change theory to use within entrepreneurship contexts. While both journey maps and behavior change are familiar concepts within design, this project combined them within the space of entrepreneurship for this first time. Because the potential for implementing design for behavior change was realized at the end of the research phase, the full design for behavior change methodology could not be employed in this project. However, there is potential to explore the intersection of these fields in future research. Apply the behavior change methodology developing entrepreneurial behavior has potential to drive progress within entrepreneurship ecosystems. The basis on behavior change in context understanding of barriers makes it broadly applicable as a method, while producing specific and relevant results for the area of study.

Design Process Reflection

Tops

Engaging stakeholders throughout the project was one aspect that went well. While not all stakeholders were available, I gained insights and feedback from several perspectives in the research, idea generation, and testing phases. This engagement drove the user-centricity of the tool and the roadmap.

Stakeholder engagement also related to the next aspect that went well- adjusting to new information. Through my initial research, I saw that connecting hubs and stakeholders to one another might be one way to add value and increase impact. This community perspective shifted my early design vision away from developing a value proposition. In receiving feedback on potential design ideas a few weeks later, I learned that a hub network had formed in Kenya recently, and one was in process in Rwanda. The purpose of these networks overlapped with one of the main goals of my lead design idea. Based on this feedback, I successfully pivoted again to the final vision and design.

Tips

I worked four days a week in the project's first half. Aside from the practical time needed for other responsibilities, the day off each week provided space from the project. It allowed me time to process and step back from work. This helped with analyzing and synthesizing information in light of the overall project goal.

After midterm, I began working full time. Without this space, I focused on the project's details without stepping back to create the story of how those pieces fit together. This was apparent in the change of focus of my communications from the overall project to particular portions. My coaches' feedback helped me recognize this and refocus by taking a vacation. This observation has inspired me to plan "processing time" into future projects. This will help me as a strategic designer to maintain the connection between the big picture and the tactics personally and thus in how I communicate.

Reflection

When I enrolled in this master's program, I resolved to go outside my comfort zone as much as possible. This meant taking SPD Media in sketching, knowing my poor drawing skills. It also led me to take Design Consultancy Practice as an individual instead of a group to create a business plan to extend my family bakery business. Finally, for this graduation project, this resolution led me to self-initiate a project in the dynamic space of social entrepreneurship for sustainable development.

My goal was to do something with the experience I gained through 3 years of working in a social enterprise startup in Rwanda. I wanted to understand what support might exist that we didn't know about then and how I could contribute my experience to those support structures. I achieved both goals within the project.

Conducting field research allowed me to offer my experience to help the hubs I interviewed while they shared their knowledge and best practices. I found this research method engaging and motivating because every conversation becomes an ideation session. All of the in-person interviews ran long. While I officially ended the interview, we both wanted to continue the conversation and what flowed was an open exchange of perspectives, 'what ifs,' and ideas. I will continue to practice field research to improve my ways of capturing, sharing, and using its insights within my design work.

Part 2: Research

This part of the report goes through each of the three parts of the research conducted to understand the context, culture, and people in the entrepreneurship ecosystems of Rwanda and Kenya.

Table of Contents

Introduction

This part of the report details the research conducted to answer the question, how do innovation hubs in Rwanda and Kenya impact sustainability in the entrepreneurship ecosystem? The research question was formulated to support the definition of a design challenge and the development of a solution to help ASME scale the sustainable impact of their innovation program, ISHOW.

Part Structure

The research question was divided into sub-questions. The points following each question indicate how the research to answer each sub-question contributed to the design process.

Chapter 6: What influences sustainability in entrepreneurship ecosystems?
- Identify areas for further research (specific stakeholder groups)
- Provide context for the design through understanding Rwandan and Kenyan ecosystems
- Identify factors that hubs can use to impact ecosystem sustainability

Chapter 7: Who are the stakeholders in the entrepreneurship ecosystem?
- Understand the groups working within the ecosystem and their motivations –this allows design for shared value
- Understand stakeholder interactions and the tensions that hinder them
- Identify needs and opportunities for the ecosystem, entrepreneurs, and hubs

Chapter 8: How do hubs currently practice triple bottom line sustainability?
- Understand how hubs currently impact sustainability
- Identify practices to amplify and ways to improve hub programs

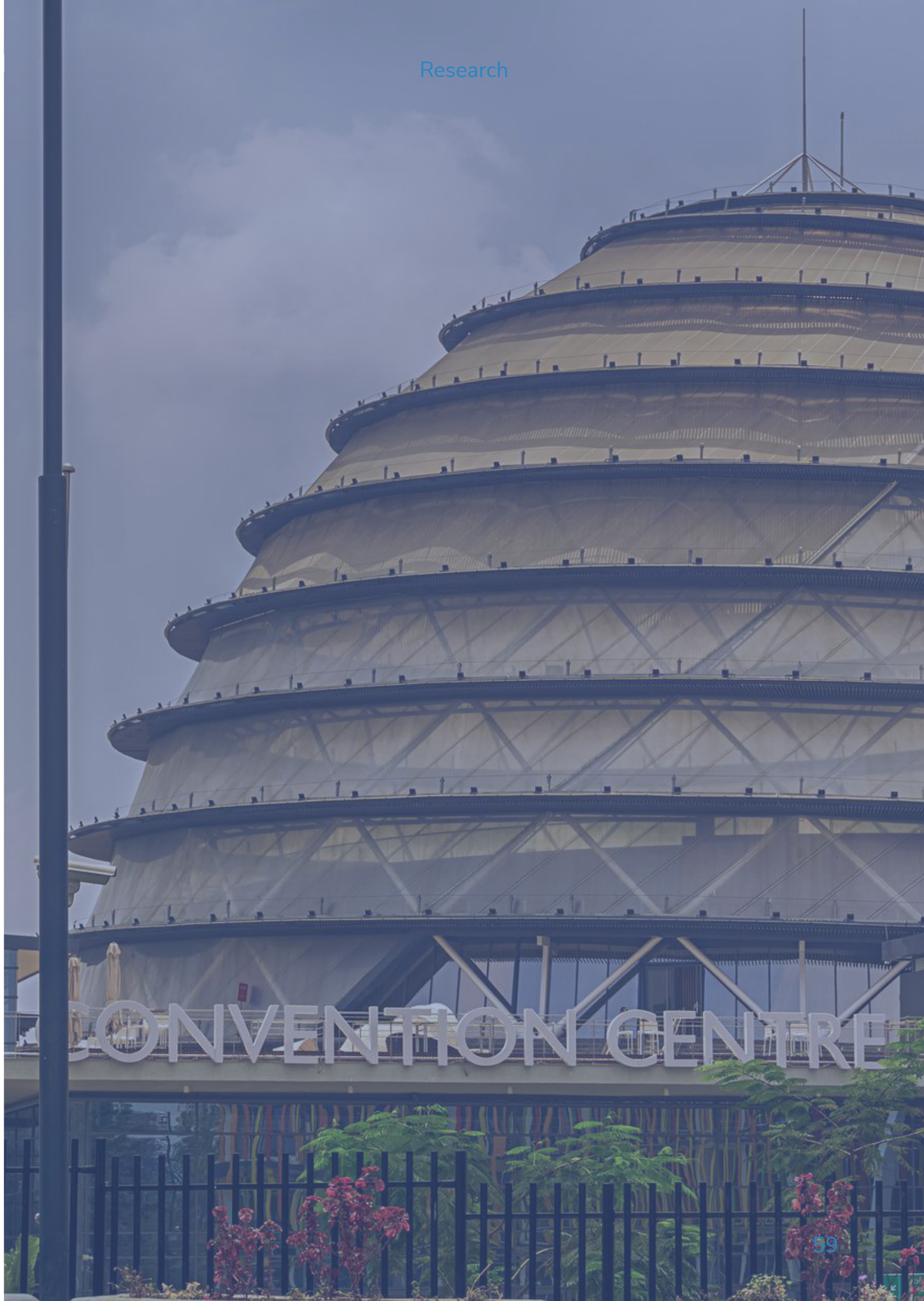
Key Terms

Within this research, the following definitions are used for these terms.

Sustainability refers to meeting today's economic, social, and environmental needs in a way that allows future generations to meet their needs. It is also sometimes referred to as triple bottom line sustainability. Any reference to impact refers to progress toward any of these three pillars of sustainability.

Entrepreneurial Ecosystems refer to the interconnected elements and people that work together to foster economic development by supporting new businesses.

Hubs are organizations within these ecosystems that introduce entrepreneurs to the ecosystem by facilitating networking and offering support services.

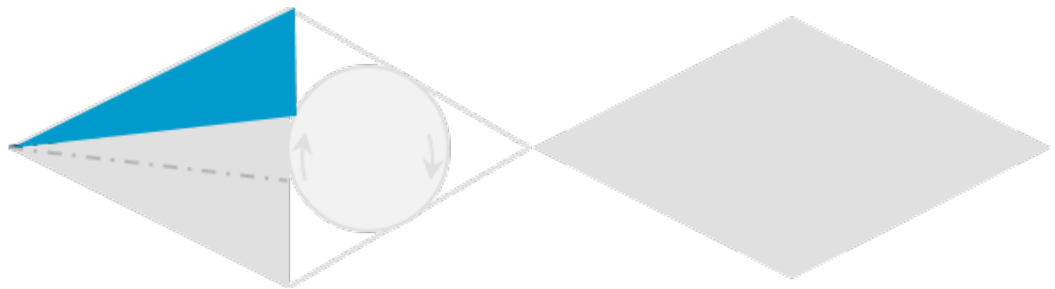


Chapter 6
Ecosystem Factors

Overview

Entrepreneurship ecosystems have received increasing attention in the last decade due to their ability to drive economic development. These ecosystems consist of interconnected people and elements working together to support the growth of new businesses. This work summarizes literature on entrepreneurship ecosystems in order to discern the role of hubs within them and to describe the ecosystems of Kenya and Rwanda. Tiba et al (2020) propose an integrated model of ecosystem factors as opposed to Spigel's (2017) hierarchical one. The model groups eleven factors into three categories: social, cultural, and material. Hubs impact one factor in each group: networks, cultural attitudes, and support services, respectively. Through these factors hubs can encourage entrepreneurs and the ecosystem to take a triple bottom line approach to entrepreneurship. These factors and integrated categories also helped to describe and interpret Rwanda and Kenya's ecosystems. Rwanda has a young, growing ecosystem with a sustainability orientation. The main challenge is to continue promoting social entrepreneurship amid a small market and preference for job stability. Kenya has a strong entrepreneurial spirit and ecosystem fueled by a history of industry and entrepreneurship. The main challenge here is to ensure social entrepreneurship grows with the ecosystem.

Chapter Contents



Literature Review

Introduction and Method

Literature research was conducted to answer the question "what influences sustainability in entrepreneurship ecosystems." The search focused on "sustainable entrepreneurship ecosystems in Africa". The most relevant articles were selected to understand types of entrepreneurship ecosystems and their value and specifically how these ecosystems look and function in Africa. The goal was a nominal understanding of current research in the area to identify methods and areas for further research.

Why entrepreneurship ecosystems?

Entrepreneurship drives economic development by addressing needs and wants within the market (Roundy 2016). When those market needs are due to environmental or social challenges, entrepreneurship has the potential to drive economic, environmental, and social progress simultaneously (Roundy 2016). Entrepreneurship ecosystems in Singapore, Israel, and Iceland have helped to drive rapid economic growth through coordinated efforts among stakeholders (Isenberg 2010). Countries seeking to gain or retain an economic advantage hope to understand which efforts they can implement to foster similar growth.

What is an entrepreneurship ecosystem?

There are several models that describe the people, services, and structures which encourage entrepreneurship. Entrepreneurship ecosystem, EE, is the term used to describe the people and factors that impact the people and activities that develop businesses. According to Isenberg (2010), it is "a set of interconnected elements such as leadership, culture, capital, markets, human skills and support that foster entrepreneurial development." Cohen et al. (2006, p. 3) defined a sustainable entrepreneurship ecosystem as "an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures." Thus, the markers of a sustainable entrepreneurship ecosystem include

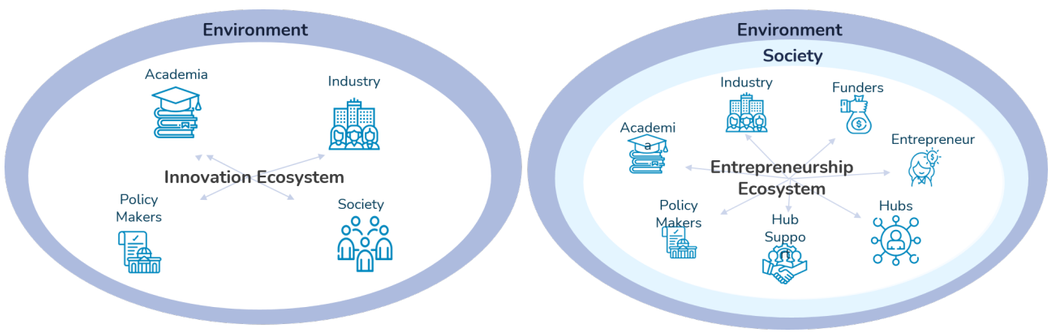


Figure 6.1: 5 Helix Innovation Ecosystem and Entrepreneurship Ecosystem

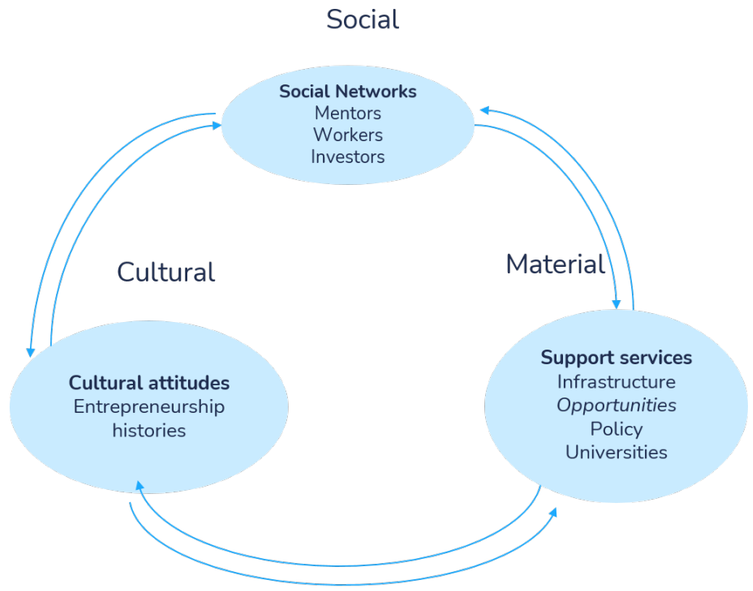


Figure 6..2 Three Groups of Ecosystem Factors

interconnected elements, community, and support for sustainable entrepreneurial development.

The elements of these systems may differ based on their specific focus. For example, the innovation model focuses on the knowledge economy- the processes of creating knowledge (universities) and applying it or using it (industry) within a policy framework (government). These three stakeholders make up the triple helix innovation model. Civil society, including the general public, elements of media and culture, forms a fourth helix. Including the public adds user centricity to innovation, and the media and culture elements facilitate knowledge sharing and adapting while helping to create a knowledge society. All these stakeholders operate within the natural environment that provides both resources and opportunities for innovation. Together, these five helices define a cooperative system of knowledge and innovation for sustainable development (Carayannis 2012).

Entrepreneurship Ecosystems

Entrepreneurship ecosystems offer an extension of this innovation ecosystem because their primary goal is creating new businesses. These businesses may form around well-established products or services, such as logistics, or new innovations. This difference places entrepreneurs at the center of these ecosystems. Financial institutions or funders of the new enterprises also form another stakeholder group. While these may also play a role in innovation ecosystems, established commercial businesses fund the research that may generate increased revenue in the future.

Spigel (2017) and Tiba et al. (2020) describe entrepreneurship ecosystems as comprising three interrelated groups of eleven elements (Fig XX). Of these groups, Tiba mentions that hubs influence one factor in each group, namely, social networks, support services, and cultural attitudes. The next section briefly explains these factors pertinent to hubs. Following that, characteristics of Rwanda and Kenya corresponding to these factors are

analyzed to understand each country's entrepreneurship ecosystem.

Ecosystem Factors Influenced by Hubs

Support Services. Hubs represent the most common providers of support services in an entrepreneurship ecosystem. Due to the prevalence of hubs, entrepreneurs generally seek support from hubs first. There, their either receive the support they need directly or get connected to the right provider. Among their benefits, hubs may provide workspace, mentoring, funding, business and technical advice.

Culture. As mentioned above, many entrepreneurs enter the entrepreneurship ecosystem through innovation challenges and hubs. This gives these programs power in shaping entrepreneurs' perceptions of startup and entrepreneurship ecosystem culture. Culture consists of the history, practices, values, and customs shared within a group Per Tiba et al (2020), the culture of the entrepreneurship ecosystem and successful entrepreneurs impact the proportion of sustainable startups more than the general culture of society. In order to develop a supportive entrepreneurial culture, hubs should facilitate and promote open communication, entrepreneur adaptability, positive rewards, outcomes and impact (Mukiza et al 2020), and support for risk-taking and mistakes (Isenberg 2010).

Networks. As the name implies, hubs regularly connect entrepreneurs, investors, and mentors from industry and academia. Hubs can also connect entrepreneurs to the government, although this is less frequent. An example is a Kenyan accelerator that helps entrepreneurs register to receive the required training to qualify for export approval. As a network center, hubs curate their stakeholder network as a means of impact. For example, ASME supplements its network of engineers with Kenyan professors and professionals to provide culturally relevant technical expertise within its accelerator. This practice of curating stakeholders adds to the hubs' subject matter expertise capacity and shifts its culture, in this example to reflect the host country. During the duration of the hub program, the mentors, facilitators, and hub staff an entrepreneur encounters help to form an impression what entrepreneurship means. Conversely, these stakeholders are also influenced by their interactions with the hub, entrepreneurs, and other experts.

Entrepreneurship Ecosystems in Rwanda and Kenya

Due to the differences in geography, population, culture, economy, and ecosystem maturity, Rwanda and Kenya have noteworthy differences in the dynamics of their entrepreneurship ecosystems. Fig XX shows specific characteristics of each ecosystem evaluated to show whether it positively affects sustainability and entrepreneurship (+), has minimal impact, or potentially affects sustainability and entrepreneurship negatively(-).

Rwanda

Rwanda has a strong government influence that helps the entrepreneurship ecosystem by supporting the creation and growth of local businesses. According to the former World Bank ratings, Rwanda has regularly been one of the easiest places to do business (Isenberg 2010). These business-friendly policies have resulted in a quickly growing entrepreneurship ecosystem with movement and interest from investors, founders, and industry looking into Africa. Zipline, a global startup focused on equitable logistics in medical supplies, is part of that movement as it established its first operations in Rwanda. Ampersand, the largest Made in Rwanda startup, provides electric motorcycles to taxi drivers in a model that increases their income. The government of Rwanda's Vision 2050 continues supporting Made in Rwanda businesses, sustainable energy, and those contributing to its Green Growth.

Factors that hamper the development of a sustainability-oriented entrepreneurship ecosystem in Rwanda include its small population, stability-focused work culture, and accessible welfare support. The strength of welfare support is evident in the health coverage that ensured a target group vaccination rate of over 90% against HPV (Sayinzoga et al. 2020).

Entrepreneurship Ecosystem Factors

Kenya

On the other hand, a Kenyan interviewee working in Rwanda stated, "We never rely on the [Kenyan] government for anything. And we have a hustler mentality because no one will look out for you". This statement reflects both lower trust and government involvement, as well as the difficulty many Kenyans face accessing government support. The need for self-reliance also encourages entrepreneurs to solve their social challenges within a culture supportive of individuals pursuing entrepreneurship. As mentioned, the Kenyan government is more hands-off; however, its Vision 2030 also supports climate resilience and natural resource management initiatives.

Kenya has a larger market and industry presence supplying mentors and investors for the ecosystem. In addition, there are prominent universities in Kenya, including private schools, like Strathmore University and a Pan African University campus.

Kenya's tech entrepreneurship ecosystem gained international attention with the success of the first mobile banking solution, M-Pesa. As a result, more financial solutions have been developed and sought by investors. The impact of M-Pesa's example is felt by social entrepreneurs, one of whom commented, "It would be really nice to have a less only fintech skewed environment."

These factors represent the more mature, technology-focused entrepreneurship ecosystem in Kenya, whose challenge is ensuring considerations for the environment and society are not left behind.

Regional factors

Both governments are implementing policies to increase ICT infrastructure and education. They have also set aggressive goals for digital readiness to gain digital prominence within Africa. This competition supports an entrepreneurial culture, however, it is unclear whether these entrepreneurs will continue to seek opportunities among societal challenges. This uncertainty creates a need to incorporate social and environmental impact into the high economic growth focus of technology-based innovation.

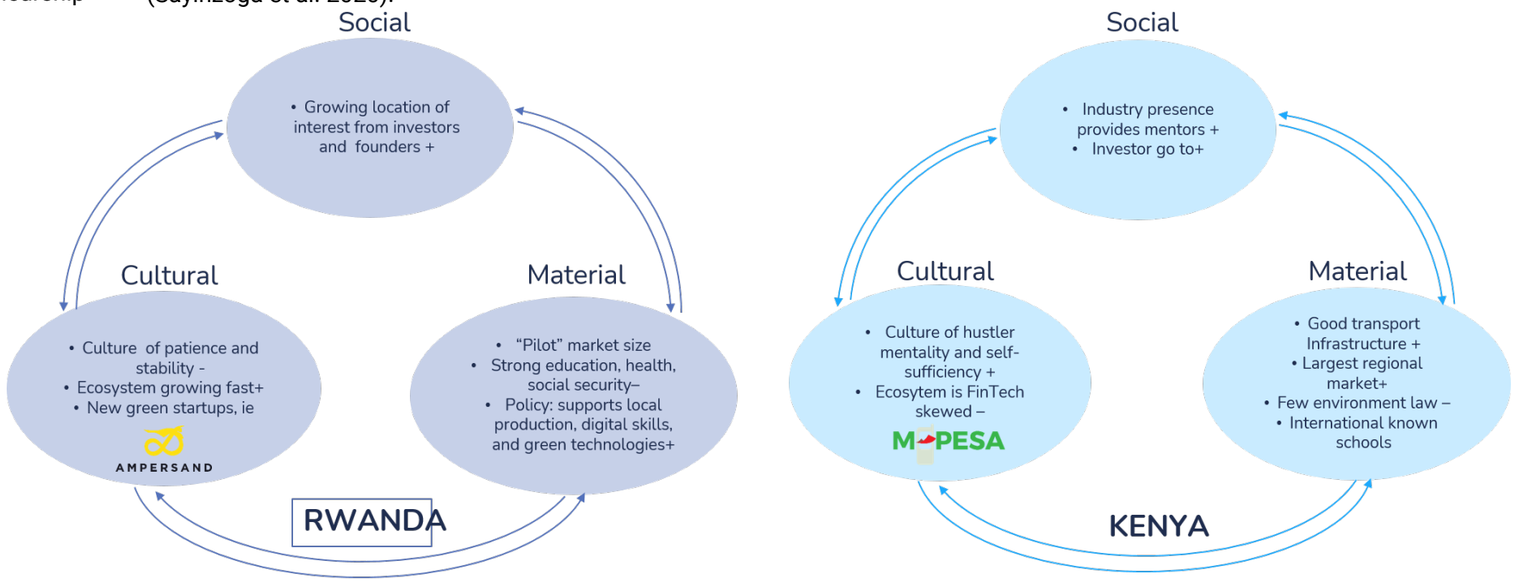


Figure 6.3: Ecosystem Factor Model Applied to Rwa

Conclusions

The mix of factors in Rwanda creates the challenge of encouraging entrepreneurship to build a pipeline and ensure that the culture starts and stays sustainable. Hubs can influence this by networking to show a clear pathway of support for potential entrepreneurs.

Kenya's size, hustler mindset, and leadership a regional commercial center explain the strength of its economy and entrepreneurship ecosystem. Hubs can help harness this strength by introducing experts with knowledge of building environmental and socially conscious businesses.

To create greater impact in both countries, hubs supporting idea phase can teach methods to identify opportunities within social challenges. They can also incorporate tools that consider environmental and social impact, for example the Sustainable Business Model canvas.

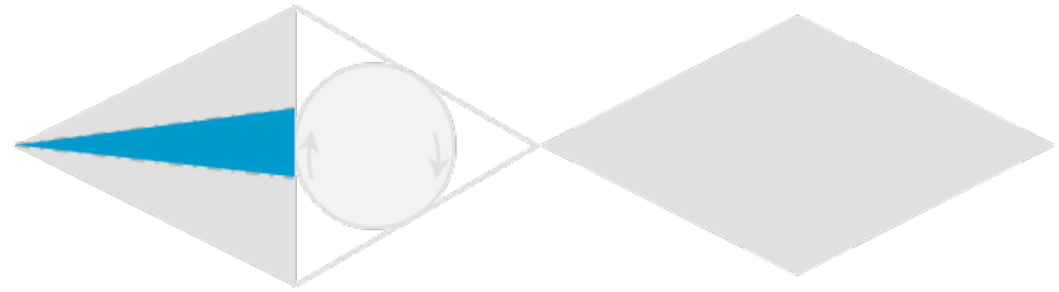
Key Insights

- Hubs can impact ecosystem sustainability through their support services, social network, and culture
- Identify opportunities to increase the sustainability orientation of the Rwandan and Kenyan ecosystems include
  - Facilitating a sustainability oriented support pipeline
  - Showing the economic value of social entrepreneurship
  - Teach social and environmental impact tools for technology
-

Chapter 7
Ecosystem Stakeholders

Overview

Entrepreneurship ecosystems support economic development through the resources of its stakeholders who work together to facilitate new businesses. Seven groups serve as the most common stakeholders within these ecosystems: entrepreneurs, innovation hubs, funders, academia, industry, hubs support networks, and government. A combination of interviews and literature research about each of these stakeholders in Rwanda and Kenya provided data to answer the questions: how do stakeholders interact in entrepreneurship ecosystems? This data was analyzed in two ways: by mapping interactions between stakeholders visually and by analyzing quotes drawn from the research according to the DIK (data-information-knowledge) scheme proposed by Sanders and Stappers (2012). The interaction maps showed that hubs and entrepreneurs have relatively weak relationships with academia and industry compared with their relationships to funders and each other. Clusters and themes created via the DIK scheme showed that acquiring funding and resources is a major need within the ecosystems. Entrepreneurs want to learn how to create environmental and social impact within their businesses. They need hubs to consider their need to balance building new skills and capacity with building their businesses. Hubs have opportunities to do more beyond startup support, to build their credibility, and to facilitate partnerships centered around innovation.



Chapter Contents

Introduction and Data Collection

Introduction

In this chapter, the research focused on uncovering the "Who" within the entrepreneurial ecosystem. An entrepreneurial ecosystem is a group of people and factors that work together to support the founding and growth of new businesses. The most common groups of stakeholders within these ecosystems were identified in the previous literature review (Figure 7.1.

| Figure 7.1 Common Ecosystem Stakeholders

These stakeholders were analyzed through interviews, literature, news articles, and videos. This analysis resulted in an understanding of the interactions among stakeholders, as well as each stakeholder's goals and challenges. These interactions and challenges guided the design goals and criteria, respectively.

Data Collection

Multiple data sources provided a contextual overview of the system in which hubs and entrepreneurs operate. Table 7.1 shows an overview of how data was collected for each stakeholder. The Appendix gives a complete list of data sources, including references.

Selection of interviewees

Interviews were the primary source of data for this work. A combination of convenience and snowball sampling methods identified interviewees. First, the researcher used personal and ISHOW networks to identify potential interviewees for each stakeholder group. From these conversations, additional interviewees in different stakeholder groups were identified based on suggestions from participants. The goal was to interview one person from each stakeholder group with an understanding of each country. In a group where interviewees were not available, other data sources provided information to understand the role, goals, and needs of the stakeholder group. An example of this is the stakeholder group of government for each country.

Stakeholders

Semi-structured interviews explored the stakeholder's values and how they interacted with other stakeholders, including society and the environment. The primary categories of questions were:

- What is the value you give to the stakeholder?
- What is the value they offer you?

- What are the challenges you face within this interaction?
- How do you feel this interaction might be facilitated or improved?

Where interviews were not possible, the researcher utilized sources likely to contain first-person perspectives, including organizational reports, websites, news articles, videos, and press releases.

To find literature and media references, internet searches combined the following terms:

- Stakeholder: group name or a known example, Kenya industry "Kenya Airways"
- Ecosystem: innovation or entrepreneurship
- Location: Rwanda, Kenya, East Africa
- "Sustainability": environmental or social. This term was left out if the search did not yield relevant results

| Table 7.1 Summary of Ecosystem Stakeholders and Data Sources Used

Stakeholder Group	Location	Perspective (Occpation/ Company)	Data Source
Policy Makers	Kenya	Government	STI Policy, Innovation Report
	Rwanda	Government	STI Policy, Entrepreneurship Policy, Climate Strategy News article
Academia	Kenya	Professor (1), Student (1)	Interview
	Rwanda	Principal (1), Lecturer (1)	Interview
Industry	Kenya	Kenya Airways, Safaricom	Innovation Workshop video, News articles, Corporate Report
	Rwanda	Economic Development, Experts	Blog, News article
	Africa	Director, Social Innovation Johnson & Johnson	Interview
Funders	Kenya	GlobalX Investments, Founder	Interview
	Africa	AfriLabs- Catalytic Africa	Slide Deck
	Global	CC Investments, Founder	Interview
Hub Network	Africa	AfriLabs, Community Manager	Interview, Reports
	Kenya	ASSEK	Website, Conference Presentation
Hubs	Africa	Global Accelerator Learning Initiative, AfriLabs	Reports
NGO	East Africa	World Food Program Innovation Advisor	Interview
		USAID	Official Blog
Entrepreneurs	Kenya	Various industries	Interview (1), Informal conversations (2)
	Rwanda	Various industries	Interview (4)

Entrepreneurs

Interviewees. As the primary customer of hubs, a deeper understanding of entrepreneurs' needs was desired. In total, six people from five different companies were interviewed to understand their entrepreneurship journeys. Four of the companies operated in Rwanda and one in Kenya.

To supplement the Kenyan entrepreneurship perspective, the researcher attended networking events hosted by hubs and talked with two additional entrepreneurs working in Kenya. ASME also provided notes from two recent entrepreneur interviews. This combination of data provided a sufficient understanding of the Kenyan entrepreneurship journey.

Interview Procedure. Interviews with entrepreneurs followed either of two approaches. First, all discussions began with a personal and project introduction when the researcher requested permission to record the conversation. Then, each entrepreneur responded to the following two questions, which helped to determine how to structure the rest of the interview.

- Tell me about your idea/business.
- How did you come up with the idea?

For those who had experience with a particular hub interviewed, the interview walked through four stages of their interaction with the hub: Awareness, Evaluation and Selection, Experience, and Follow Up. These same four stages were used in interviews with hubs to detail their programs. This progression helped to capture what the entrepreneur remembered about the value, challenges, and benefits of the program. Four of these "Hub Experience Interviews" (Questions in Appendix) were conducted in this manner.

Some sample questions include:

- What motivated you to apply?
- What was the most helpful aspect of the program? Why?
- In what ways did you interact with the hub after you completed the program?

In "Venture Development" interviews (Appendix), the two entrepreneurs with more than ten years of experience walked through their venture development journey. This process led interviewees to describe their challenges, successes, and frustrations in their business and within innovation programs. It also avoided challenges with remembering data about specific hubs. While these "Venture Development" interviews (Appendix XX) were less structured, the interview generally went through the stages of entrepreneurship, including:

- Need Finding and Validation
- Prototyping and Testing
- Business Development and Scaling

All entrepreneurs finished by offering other impressions and reactions from any hub in which they participated. Each entrepreneur provided information about their knowledge of ways to incorporate environmental sustainability into their lives and businesses, as this did not come up within the general flow of most interviews. All entrepreneurs discussed solving a community or societal need as a motivation for their innovation's product, service, or delivery method. This process resulted in an overall impression of how and when entrepreneurs sought hubs and how they perceived the benefit at different points in their journey.

Data Analysis and Results

Stakeholder Mapping Analysis and Results

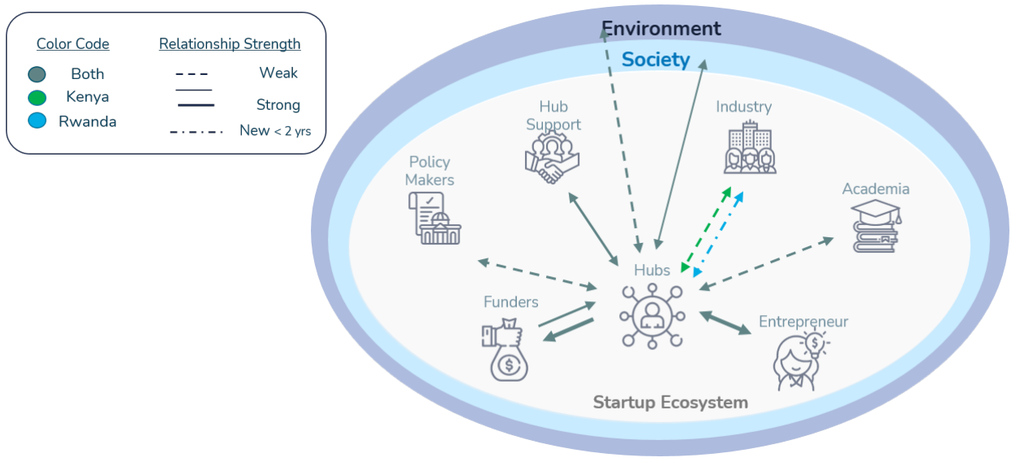
The first part of the analysis involved characterizing stakeholder roles and interactions to answer the questions: Who acts in entrepreneurship ecosystems and how?

First, priorities capture information about each stakeholder's role. Next, stakeholder maps depict interactions as new, weak, medium, and strong relationships between stakeholders in each country (Figure 7.2). Opportunities offer potential ways for the stakeholder to do more within the ecosystem. The Appendix has a table with priorities, interactions. and opportunities for all stakeholders

Three considerations helped to determine the strength of the interactions.

Time since the interaction started. This variable considered if the interaction has been going on for three years or more.

Nature of interaction- This variable considered the structure of the relationship. For example, many mentors within hub programs volunteer their time based on personal availability and motivation. As one stakeholder said, "There are structures in place for supporting [our own] students, but outside of those things, you just [mentor entrepreneurs] on your own time." Because of the informality of this setup, these interactions between hubs and academia were categorized as weak.Diversity of engagement- Often, stakeholders can support each other in more than one way. For example, hubs can interact with industry representatives to procure mentors, facilitate workshops, communicate calls for applications through their networks, and facilitate corporate innovation. When stakeholders relied on each other for different ways of adding value, the relationship was characterized as strong.



| Figure 7.2 Ecosystem Interaction Map for Hubs

Hubs and Entrepreneurs

Priorities. Hubs' goal is to facilitate the growth and maturity of the businesses they support in alignment with their mission. They serve entrepreneurs' capacity building, networking, and resource connection needs. Through this, hubs help startups achieve their business mission and produce a livelihood for themselves and their team.

Opportunities. Both hubs and entrepreneurs have weak relationships with academia and industry (Figure 7.3). In Rwanda, only one hub interviewed brought in industry mentors and this was for their most recent program. Hubs generally engage these stakeholders individually to provide mentorship for entrepreneurs, but these relationships can be diversified and strengthened. There are opportunities to formalize relationships on an institutional level and to engage them in other aspects of the programs. Because academia knows new sustainability research and industry has the application experience, engaging these stakeholders more can support hubs and entrepreneurs in learning and applying socially and environmentally sustainable approaches to conduct business. These approaches can help entrepreneurs save money and resources and build strong business partnerships to reach their growth and maturity goals.

Entrepreneur themes

Exciting quotes from entrepreneurs were written down and labeled with a paraphrase of the quote. These statement cards were then placed on a timeline following the stages of venture development in order to understand the needs of entrepreneurs at different phases (Appendix). The cards were also grouped vertically by the three sustainability pillars and culture. Culture captures the comments about the ecosystem and hub culture. If there were similarities among neighboring comments placed, a cluster was formed and titled with the theme. This clustering yielded themes in each pillar (Table 7.2)

Two other themes occurred around the prototyping phase. One cluster focuses on how entrepreneurs find it challenging to identify partners to help them create high-quality prototypes in Rwanda and Kenya. As an apparent result, entrepreneurs have started creating hubs focused on facilitating the

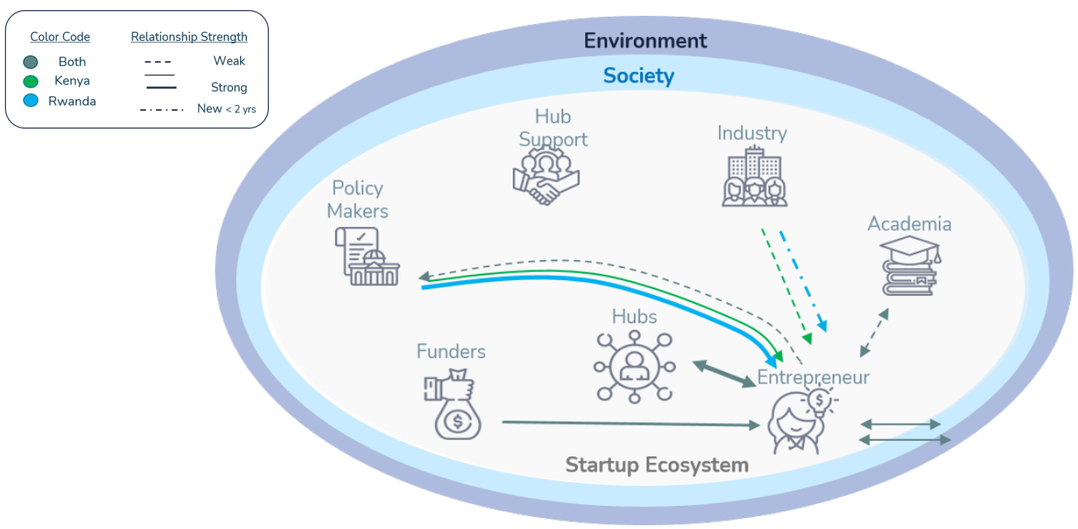


Figure 7.3 Ecosystem Interaction Map for Entrepreneurs

Table 7.2 Key Entrepreneur Themes in Each Pillar

Cluster	Quote	Interpretation
I want to know and do more in my business (Environmental)	"I cannot say I am knowledgeable about improving the environment. I think it would help greatly if I can do both [environmental and social mission]."	Entrepreneurs are interested and motivating in running their businesses in ways that support the environment. However, for those that know about the envirionment, their knowledge is often impractical or irrelevant to their work. Tangible ways of doing environmentally sound business are needed.
Challenge to attain Social impact and growth (Social)	"It's almost impossible to have a sustainable business in hardware when you're catering to low income people. When you look at home solar systems, cooking stoves, none of them are profitable."	There are many examples of the challenges and failures in creating a social impact business. Entrepreneurs need strategies and examples of ways to keep a social mission while also attaining at least break even and hopefully profitability
Time >> Value Provided by Hub content, Here for the money (Culture)	"They want so much of you and I'm thinking 'I have a business to run.' I can't clear my schedule for a week 3 days in advance or spend 2 days a week"	Particularly for businesses working to increase their scale, hub programs are seen as having little value beyond their funding. For these entrepreneurs, flexibility in timing and intensity of programs is necessary for them to be able to apply resources and content.
Gap- Advocacy, Support, and Funding between Launch and Scale up (Economic)	"There's excitement around innovation and excitement around mature organizations, BUT there's NO BRIDGE. The shiny innovator is not sustainable."	The "Valley of Death" between business launch and achieving stability is known to be a challenging phase. In response, many hub programs focus on this phase. However, the comments from entrepreneurs reveal that this support may not be appropriate for their needs. For example, being investment ready in terms of financials won't help ventures create the organizational structure they need to address their challenge- even with more money.

implementation of hardware and electronics ideas within their businesses.
Following the entrepreneur analysis, these statement cards were included with the other stakeholder data for a combined analysis of all stakeholders.

Ecosystem Stakeholder Themes

Analysis

The method used for clustering followed the information-gathering in the DIK scheme (Sanders and Stappers, 2012). Notes taken during each interview captured quotes and impressions. Meeting audio was reviewed to confirm quote data to create statement cards where possible.

These cards were clustered based on the main idea of each statement. Then, closely aligned clusters were combined again to create larger themes. Table 7.3 shows the hierarchy for the Building Credibility theme as an example. The appendix has the complete list of statements, clusters, and themes and shows the clustering exercise in Miro.

This quote from an impact focused venture capitalist demonstrates the economic value of hubs building their brand and leadership within their ecosystems.

Results

Six themes, representing clusters of clusters, and nine additional clusters emerged from this analysis. Clusters and themes which supplied

| Table 7.3 Breakdown of Building Credibility cluster

Quote	Statement	Cluster
"One thing that I look for is the brand value of the accelerator, also who the flagship investors are... having credibility and making it easy to access good startups brings in follow on investment"	Hub / Management Certifications Available	Building credibility
	Lighthouses bring interest, $ and Resources	
	Hubs Branding and Selling their Methods	
	Hub credibility Brings Follow on Investment	

criteria and motivation for the design phase of the project are explained below

- Understanding and creating Entrepreneurial Culture
- Hub Trends and Priorities
- Generating and Finding Funding
- Tensions Between Goal and Effect
- Opportunities to add value with partnerships

Understanding and Creating Entrepreneurial Culture.

This theme captures sentiments about the beliefs, communication, and community within hubs, countries, and their ecosystems. For example, a report quoted a hub manager saying, "Both hubs and ventures are not ready to accept the possibility of failure, as it reflects poorly on them and affects future investments." Being risk averse reduces the possibility of entrepreneurs attempting and hubs supporting breakthrough innovations. Hubs and ecosystems need to create a culture where mistakes and failure are accepted as part of the learning process to progress faster.

Generating and Finding Funding.

Money and resources were a recurring subject in interviews and reports. Hubs spend considerable effort to secure funding or to acquire resources and services for the entrepreneurs they serve directly. According to a study on innovation programs, "Hubs are characterized by hybrid revenue models... [they] are increasingly reliant on external donors to fund their operations."

Hub Trends and Priorities.

With the rapid growth in the number of hubs in the last four years, these organizations are broadening their focus and operations. A hub network report said, "More and more hubs are focusing on different ways to create wider social impact ... that may not be strictly startup-focused." Hubs realize the dual impact of operating as businesses on their economic own sustainability and the triple bottom line of the ecosystem.

Tensions Between Goal and Effect.

Stakeholder activities do not always produce the intended results. For example, an entrepreneur said, "Spend 90% of the time doing follow-up reports for them and not the real work." The hub aims to support entrepreneurs and understand progress with reporting, offering additional support based on progress. However, in this case, completing deliverables for the hub took significant time away from the venture.

Opportunities to Add Value With Partnerships.

The statements within these clusters show the relationships stakeholders appreciate or desire for their value. For example, one industry stakeholder said, "A big benefit of interacting with East Africa is employee engagement. I have a waiting list of people wanting to work with innovators in Africa." Interacting with entrepreneurs added value to entrepreneurs through mentoring and to the multinational company by boosting employee engagement.

Conclusions

This research helped to identify needs and gaps throughout the ecosystem to progress toward the collective goal of sustainable economic development.

In order to increase their sustainable impact, entrepreneurs need practical frameworks and examples to help them understand how to integrate environmental sustainability and a social mission into their businesses profitably. They also need more support in understanding how to organize and problem-solve on the path to scaling up. Hubs can similarly increase their impact through the application of the same approaches.

Hubs can provide for these entrepreneur needs by adding industry interactions and strengthening relationships with academia. These groups may be able to provide the expertise entrepreneurs need. Hubs also need to consider entrepreneurs' primary work as business owners when designing their programs. Doing so can avoid deliverables or the programs impeding work to grow the businesses.

List of Key Insights

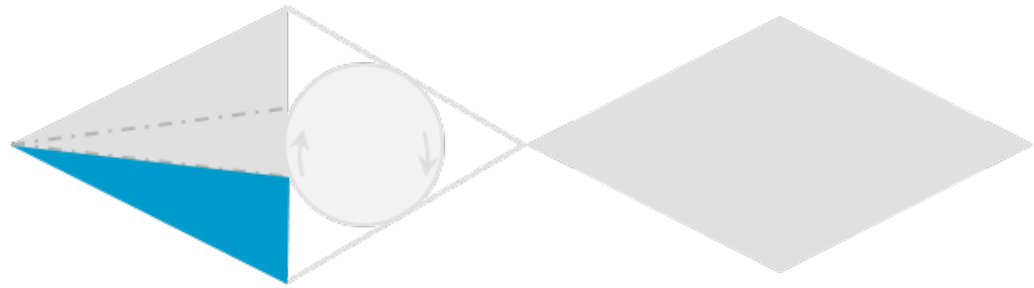
- Entrepreneurs need practical frameworks to help them integrate environmental sustainability and a social mission into their businesses profitably
  - Hubs can benefit from these frameworks
- Entrepreneurs need guidance in creating organizational structures for scale
- Hubs need to balance hub activities with business development time for entrepreneurs
- Hubs can formalize and strengthen relationships with academia and industry. NGOs may also be good resources for subject matter expertise
- Hubs are shifting from being solely entrepreneurship support organizations to offering other revenue generating services
- Securing funding and critical resources is a top hub concern
- In East Africa, failure is not accepted, even within the entrepreneurship ecosystem

Chapter 8
Hubs in Entrepreneurship Ecosystems

Overview

Entrepreneurship support organizations, also called hubs, vary widely. They support new ventures at different phases of development and may focus on specific industries. Some specifically focus on environmental and social impact businesses. However, all hubs can impact entrepreneurs through their services, network, and culture. To understand how hubs practice sustainability, interviews were conducted with seven hubs serving Rwanda, Kenya, or both. Journey maps visualized the activities involved in conducting a program, the people (network) who helped, and the policies (culture) that impact the experience of entrepreneurs. A model was developed to assess the impact potential of each activity on social, environmental, or economic sustainability. The model draws on behavior change methodology and relates impact potential to action. The analysis of the journeys identified best practices for each impact level identified in the model- inform, act, and train.

In addition, the analysis assessed program delivery activities, their touchpoints, and stakeholder engagement. Based on the results, hubs can improve impact by leveraging existing stakeholders in different parts of their programs. They can also consider the social and environmental impact of decisions, such as where to host programs and what touchpoints to use. Finally, hubs can teach social and environmental impact approaches. For example, hubs can train entrepreneurs to use a sustainable business model canvas instead of the standard version.



Chapter Contents

Introduction and Data Collection

Introduction

Per AfriLabs (2019), "A hub is a center, structure or network comprising of actors supporting or facilitating the development of an environment conducive to entrepreneurship or innovation." These centers come in many forms and offer a range of services. Table XX summarizes the literature on services typically offered by a hub of a particular type. In addition to their services, hubs can be categorized according to their industry focus and mission. Mission refers to whether the hub works toward social and environmental sustainability, promoting entrepreneurship skills, or solely economic development.

Within entrepreneurship ecosystems, hubs play the role of gatekeepers (Tiba 2020). Entrepreneurs who join hubs have access to their network, services, and an introduction to the entrepreneurial culture. These services often include mentoring, workshops, administrative support, and training. The goal of this research was to understand the ways that hubs use their services, networks, and culture to impact sustainability.

Data Collection Method

Interviews were selected as the research method. Where possible, these interviews occurred in person to also allow for observations of the hub space.

Hubs were identified through internet searches and stakeholder interviews. The goal was to interview hubs with maximum variety considering location, support type, and profile. Seven hubs were selected (Table 8.1).

Semi-structured interviews of 60 -75 minutes were conducted. The interviews identified activities taken by hubs in conducting their entrepreneurship support programs. This data helped to create journey maps of these programs.

Using Journey maps

The journeys mapped the program execution steps from the hub perspective using the four phases of the marketing journey as time points: Awareness, Evaluation & Selection, Experience, and Follow-up. These phases provided standard categories to identify

Table 8.1 Services and Resources Offered By Different ESOs

ESO	Phase	Start Up Support	Funding	Physical Resources	Networking	Time Block
Incubator	Idea	✓	✓	✓	✓	1 -2 years
Accelerator	Some revenue	✓	✓		✓	Months
Maker Space	Idea			✓		As needed
Co-working	All			✓		None
Innovation Hub	All	✓		✓	✓	>2 years

Table 8.2 Overview of Hubs Interviewed

Hub Name	Country	Support Type	Hub Profile	Industry
RP	Rwanda	Incubator	Academic	None specified
250Startup	Rwanda	Accelerator	Tech	Program dependent
ISHOW	Regional	Accelerator	Social / Environmental	Hardware
Norrsken	Regional	Co-working	Tech	None
KCIC	Kenya	Innovation Hub	Environmental	Climate Resilience
iHub	Kenya	Innovation Hub	Tech	Program dependent
Impact Hub Kigali	Rwanda	Innovation Hub	Social / Environmental	Program dependent

similarities and differences among hubs. They also align with Fonseca (2012) who identified the following variables as important in understanding hubs sustainability performance: screening process, promoting green management, training, and awareness activities.

In each phase, the journeys captured the activities completed, and the people helped (stakeholders) and the touchpoints used. They also show the potential impact of each activity or touchpoint on a pillar of sustainability. Within the evaluation section, the selection criteria are also shown.

These journey maps helped to visualize how each hub used the three ecosystem factors- support services, social networks, and cultural attitudes - to impact triple bottom line sustainability. Within this, they also answered the research sub-questions and validated previous research findings

1. Visualize activities and evaluate their impact. This analysis shows how hubs teach sustainability through their support services.
2. Visualize *stakeholder* interactions as part of program delivery (Network). Understanding these interactions confirmed or adjusted the opportunities identified in the stakeholder research.
3. Identify touchpoints, selection criteria, and other *decisions* that impact economic, social, or environmental sustainability (Culture). These findings answer the research question, how do hubs practice sustainability?

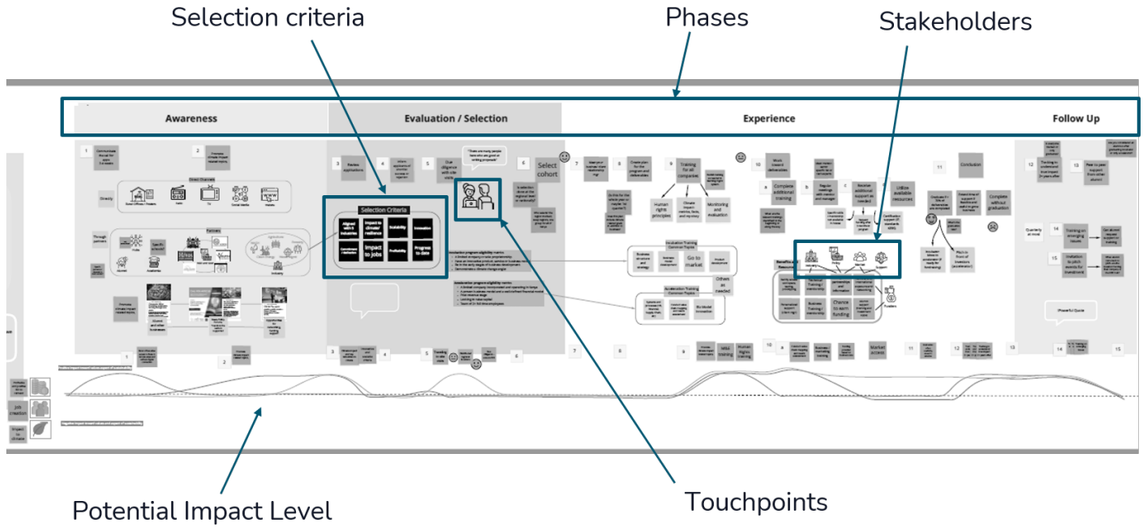


Figure 8.1 Hub Journey Map for Ecosystem Impact Analysis

Data Analysis and Results

Each section of the completed journey maps was analyzed to understand common practices and potential opportunities. The following sections present the results for each of these sections.

Activities

All Hubs followed similar processes to prepare and complete programs. This included issuing calls for applications, reviewing applicants in a multistep process, and reaching out to alumni for follow up reports and funding opportunities. However, hubs varied widely in the kinds of programs they offer in the Experience phase.

Some programs featured a structure similar to school: it had fixed start and end times each day, weekly and monthly meetings, and lunch each afternoon (Figure 8.2). Other programs offered entrepreneurs a workspace, a representative who worked within the hub, and a menu of services, trainings, and connections (Figure 8.3). In addition, the focus of the hubs ranged from digital and software based technology, climate resilience, to food systems. For some hubs, the focus shifted based on a particular program. For example, one hub had just concluded an accelerator for food systems entrepreneurs and was initiating a circular economy focused accelerator.

Selection criteria

Literature identifies selection criteria as a distinguishing trait between hubs with a social or environmental impact mission and other hubs. This was consistent with this study; all hubs with a social or environmental mission had criteria requiring positive impact to sustainability. However, sometimes program criteria did not match program offers. For example, a hub with criteria to improve a health issue did not offer sector specific support. Support was focused on general business topics such as business models instead of discussions centered on securing contracts

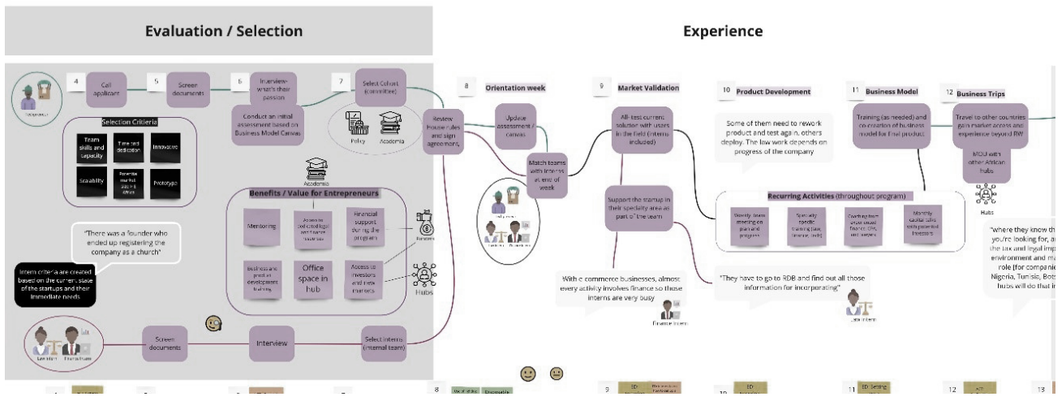


Figure 8.2 Journey Maps for a highly Structured program

with hospitals and health ministries. In these instances, This single observation shows positive progress in addressing specific entrepreneur needs compared to previous observations of no distinction among environmental sustainability profiled accelerators and others (Bank and Kanda 2016).

Stakeholders

Hubs interacted with all stakeholders in the delivery of their programs except hub networks (Figure 8.5).

Alumni and academia were most often engaged to share open calls for applications. This aligns with the focus on encouraging students to become entrepreneurs. Funders joined hub staff to select program participants from potential applicants. In these situations, funders have the opportunity to bring in representatives with subject matter expertise to provide additional perspective in the selection process. Industry representatives are the most common choice for mentorship within a program as they serve as role models. Academia and NGOs provide expertise in technical development. Hubs have the opportunity to engage academia and NGOs to provide workshops. This can supplement mentorship to maximize the value of these stakeholders' time and impact compared to the mentors sharing basic information with each mentee.

Touchpoints

The icons below represent the different touchpoints used by hubs in their activities. All hubs utilized digital touchpoints in the Awareness phase. Two hubs also used radio and television to broadcast open calls and share the hub mission. One hub accepted paper applications and communicated via rural hub offices and posters.

Hubs have an opportunity to increase impact by considering which additional touchpoints may help them to reach more entrepreneurs. Touchpoints should also be considered when sharing information such as industry specific tips in agriculture, health, or safety.

Figure 8.4 Common Touchpoints

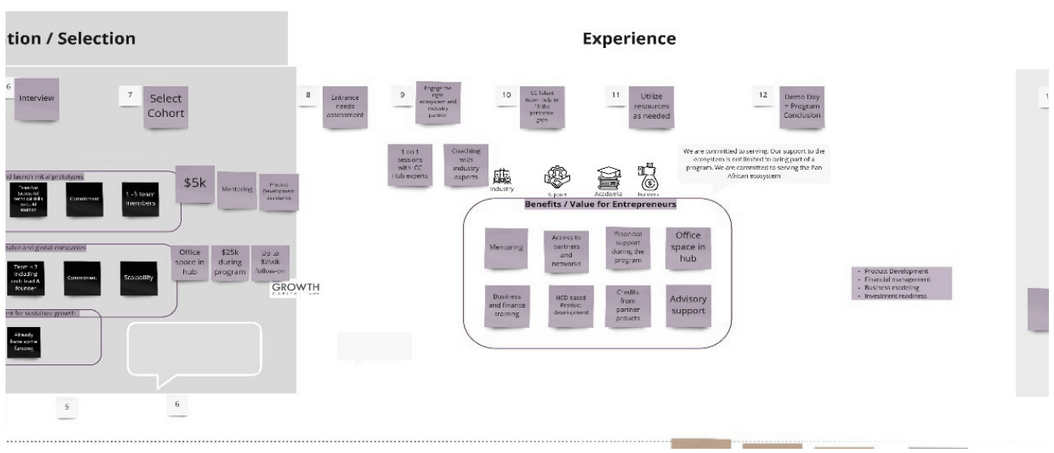


Figure 8.3 Journey Map for a Flexible program

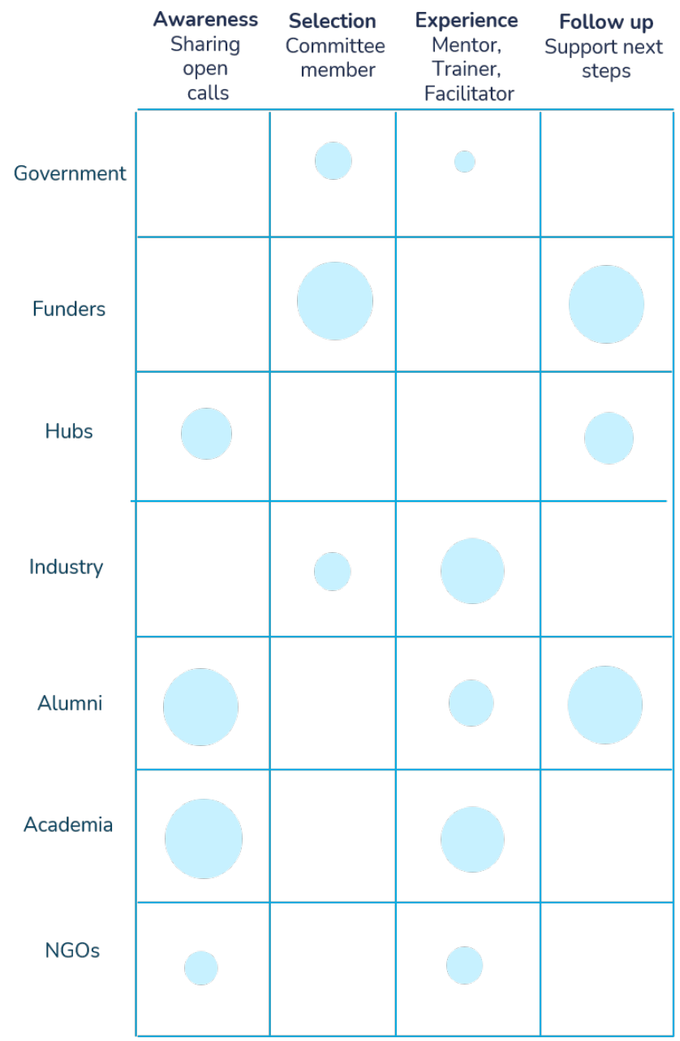


Figure 8.5 Frequency Map of Stakeholder Engagement in Each Phase

Model Development and Results

Current Impact Measurement

The impact of hubs on economic, social, and environmental goals is most often determined based on data gathered from entrepreneurs who have completed innovation programs. These measurements take time away from entrepreneurs' businesses and do not provide a clear picture of the hub's role because market factors and entrepreneur execution also affect these numbers. Fonseca (2012) developed a framework which measured incubator's environmental performance primarily based on the hub's own activities as observed and talked about in interviews. This provided a direct gauge of impact which could be confirmed with further data collection from entrepreneurs. This work follows this example of looking directly to hubs to understand their impact to all sustainability pillars

Creating a Model for Analysis

The impact level of an activity was evaluated based on the sustainability pillar affected and the potential magnitude of impact. Principles of behavior change theory helped to define meaningful levels of impact. Behavior change theory was used because the goal of all hubs is to develop successful entrepreneurial behavior.

Designing for behavior change focuses on the resulting behavior or action as a result of an intervention. This preference for action aligns with the ASME's goal to increase the impact of its hub programs. As a result, a model with three impact levels was created. Each impact level aligns to specific behavior change interventions. The relationship between the levels is shown in Figure 8.6.

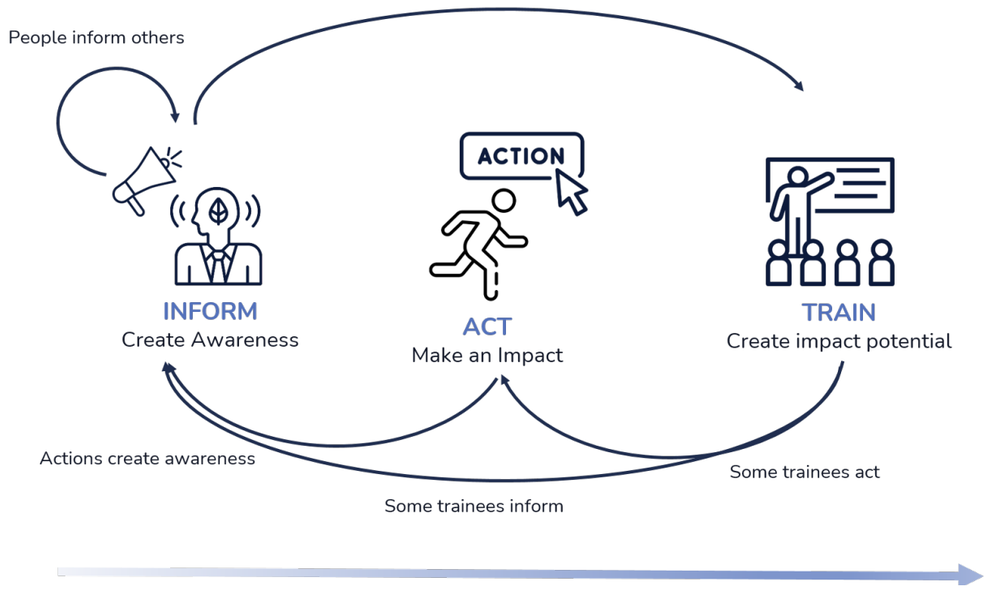


Figure 8.6 Impact Model for Hub Activities- Relationship Between Levels

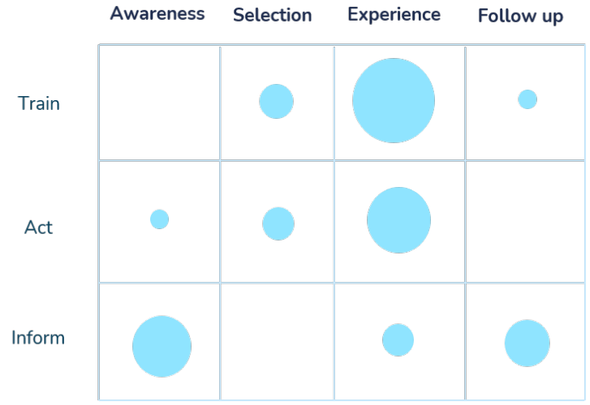


Figure 8.7 Frequency Map of Impact Activities in Each Phase of the Journey

Results- Applying the Impact Potential Model

Once the model was developed, interview notes and journey maps provided examples of activities corresponding with each impact level. An initial review of when in the journey the most impact was conducted (Figure 8.7). The most impactful activities occurred in the Experience phase due to the high interaction. Hubs also used the Awareness phase to not only market but share knowledge within the community. The following section defines each level and provides example activities and opportunities for additional impact.

Inform

Informing activities create knowledge of a topic or issue related to the sustainability pillar. These align with the educate behavior intervention. While the person informed may not have the knowledge or skills to act, they know enough to seek that information and may now be motivated to do so.

Four of the seven hubs (ISHOW, Impact Hub Kigali, KCIC, iHub) produce and share content as one way of communicating their mission.

Examples

Publish:

- Research reports
- Industry guides
- Blog posts

Opportunities for More Impact

- Reformat research as "How To" guides that teach a skill
- Share webinars and instructional videos through the same channels

Hubs can increase their impact using these same channels by formatting research as a how to. They can also share webinars or videos that train viewers in some skill.

Act

Change requires action. This level represents hub practices, things the hub team does, that impact social equity, environmental health, or their own economic viability. This level combines two groups of behavior change interventions centered on direct impact: model and enable. Guidelines for environmental practices came from Fonseca and Jabbour's (2012) evaluation of how green hubs are in

Brazil. This analysis considered daily practices including use of lights and waste management. It also assessed the hub environment including staff demographics and whether it was virtual or physical.

Examples

- Clean, green campuses- Use buildings that have clean energy (RP Tumba) and sustainable building materials (Norrsken)
    - Only use office lights in inclement weather
- DIY / Bootstrapping- Reduce costs and environmental burden by purifying their own drinking water and repairing their wooden office furniture (Impact Hub Kigali)
- Design Thinking- Teachers use design thinking to develop market acceptable innovations. Lessons learned about the design process are then incorporated into the incubation center process. (RP Tumba)

Opportunities

- Hubs who rent their buildings can consider ways to manage their resources. For example, sinks operated by foot pedal to make it easy to use less water and reduce possibility for spreading illnesses
- Use tools taught to entrepreneurs within the hub Ex Use a lean process to develop new services

An important observation when asking hubs how they practice sustainability was the impact of the conversation on the mindset of the interviewee. For example, in the interview with Impact Hub Kigali, the initial reaction was slow to answer. However, once we walked through the hub, the manager mentioned several practices that both helped save money and resources. The manager also started to think of new ways they could do more. Similarly, a conversation with a tech hub brought a response of, “we don’t really do anything environmental… some of our entrepreneurs support agriculture”. However, a suggestion to the hub about green software initiatives resulted in a hub team member attending the next conference.

This observation contrasted with the reaction of hubs with green campuses. In these conversations, the clean energy systems were quickly identified as a sustainability initiative.

Train

Train activities lead to new skills to address economic, environmental, or social issues. This level has the largest magnitude because it creates practitioners and informants among the trainees, exponentially increasing impact potential. These activities match the behavior intervention of the same name.

Examples

- Curriculum choice- Suggest relevant services to entrepreneurs and allow them to choose.
- Alumni Training- Offer additional training to alumni in emerging topics.
- Job training (beyond entrepreneurs)- Provide training and internships to finance and law students to fill knowledge gaps in startups
- Train Fellows to provide the first round of technical review for applications

Opportunities

- Offer some standard trainings or an assessment to make sure entrepreneurs get what they need
- Use follow up reports to offer specific training relevant to alumni progress

Design Conclusion and Reflection

Conclusions

Hubs vary widely in their focus, structure, and mission. In addition, a single hub may offer programs related to different industries and with different structures. This variety demands flexibility in any approach to support hubs in practicing social and environmental sustainability in new ways.

Based on the results, hubs can improve impact by leveraging existing stakeholders in different parts of their programs. This includes bringing subject matter experts into selection committees. Hubs can also ensure more efficient sharing of information. Industry, academic, and NGO stakeholders can provide workshops to share their expertise broadly. This can help entrepreneurs to become more aware of their blind spots and make mentoring sessions more impactful. Hubs can also increase the reach of their activities by assessing their choice of touchpoints for application calls and information sharing.

When considering what types of content add trainings for, hubs can review their own selection criteria. While all social impact hubs had impact criteria, some had criteria for which there was no supporting activity. An example of this is scalability criteria without supporting market research or value chain assessment. Hubs can also exchange the tools they use for ones that consider economic and social impacts, like the sustainable business model canvas.

Hub practices provide a motivating example to entrepreneurs of what operating sustainably looks like. Furthermore, recognizing these practices motivates hubs to find more ways to create impact through their own actions. This mindset shift means hubs will be more likely to continue any cost saving actions with environmental or social benefit into times of prosperity. This culture will also impact tenant entrepreneurs and their businesses.

List of key insights

- Hubs vary widely in their focus, structure, and mission
- Improve impact by leveraging existing stakeholders in different parts of their programs
- Hubs should consider more efficient ways sharing of information
- Hubs increase impact by considering the tools they use
- Hubs recognizing opportunities to practice sustainability improves their motivation

Research Conclusion

This project posed the question *"how do innovation hubs in Rwanda and Kenya impact sustainability in the entrepreneurship ecosystem?"*

The research in this project provided a snapshot in time of the entrepreneurship ecosystems in Rwanda and Kenya. It looked at the whole ecosystems from the perspective of the factors and stakeholders that make them up, and dove into the perspectives of hubs and entrepreneurs. Through it, opportunities and barriers within the ecosystem were identified which inspired the design solution.

Chapter 6 summarized literature to understand the stakeholders and factors that comprise entrepreneurship ecosystems. Hubs have the ability to influence entrepreneurs through their support services, social networks, and culture. Each of these factors is a leverage point for design. Chapter 6 also uses the ecosystem factors model proposed by Tiba et al to characterize the sustainability orientation of the entrepreneurship ecosystems in Rwanda and Kenya. By providing an assessment on the Rwandan entrepreneurship ecosystem, this work helps to build the limited body knowledge on this topic.

Chapter 7 used existing and original research to understand stakeholders within the entrepreneurship ecosystems. This identified both ecosystem and individual stakeholder needs and opportunities to achieve economic development. A broad view of all stakeholders was taken in this work, however, future research can look specifically at stakeholders working toward implementing triple bottom line sustainability throughout the ecosystem. Doing this work over time can show how, and if, the support for environmental and social responsibility grows and how each stakeholder groups contributes to the ecosystems triple bottom line sustainability orientation and outcomes.

Chapter 8 provides a deep dive into the interventions hubs use in their entrepreneurship support programs. This work used the lens of behavior change within entrepreneurship support to develop an original impact measurement model. As the first application of this methodology in entrepreneurship support, there is a potential area for further research. Future research should explore using behavior change theory to design programs for entrepreneurs in the valley of death. This methodology may help identify the specific types of support and intervention which can help these entrepreneurs to succeed or to fail faster.

Limitations

As a graduation project, this research was limited to a scope that captured inspirations for design within the five month scope of this project. This mainly limited the number of interviews which were conducted in Chapter 7. While data sources effectively offered insights into the perspectives of government officials, ideally each stakeholder group would have a representative interviewed.

In spite of these limitations, this research contributed to the sparse body of knowledge on entrepreneurship ecosystems in Rwanda and Kenya. Specifically, it considered how stakeholders, factors and practices impact and promote social and environmental sustainability in addition to economic development. It represents the first deliverable requested by ASME, an understanding of the current state of the entrepreneurship ecosystems.

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Research Conclusion

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