Modes of Innovation and Enterprise Development by Nairobi's Mobile Tech Startups

Victor Nzomo, Jacquelene Mwangi, Louisa Matu-Mureithi, Caroline Wanjiru Muchiri, and Isaac Rutenberg

Working Paper 22
Published: 8 June 2020

openAIR
AFRICAN INNOVATION RESEARCH

Contents

Authors 1
Abstract 2
Acknowledgements 2
Keywords 2
I. Introduction 2
A. Context and Research Problem 2
B. Research Questions 5
II. Research Design 6
A. Methodology 6
B. Sources of Primary Data 6
III. Open Collaboration 9
A. Location 10
B. Organisation of Workspaces 11
i. In Cluster Hubs 11
ii. In Company Hubs 12
C. Development of Business Ideas 12
i. Spontaneous Approach 12
ii. Human-Centred Design 12
iii. Lean Canvas Technique 13
D. Modes of Collaboration 13
E. Benefits of Collaboration 14
F. Collaboration's Potential Limitations 15
IV. Human Resource Development 16
A. On-the-Job Practical Training 16
B. Gaps in Formalised Tertiary Education 17
V. Knowledge Governance 18
VI. Scaling 20
VII. Conclusions 21
References 22
Appendix I: Data Collection Instrument 27

Authors

Victor Nzomo
PhD Candidate, Faculty of Law, University of Cape Town
Research Alumnus, Open AIR New and Emerging Researchers Group and Centre for Intellectual Property and Information Technology Law (CIPIT), Strathmore University

Jacquelene Mwangi
SJD Candidate, Harvard Law School
Research Alumna, Open AIR New and Emerging Researchers Group (NERG) and Centre for Intellectual Property and Information Technology Law (CIPIT), Strathmore University

Louisa Matu-Mureithi
Legal Intern, Oracle EMEA
Research Alumna, Open AIR New and Emerging Researchers Group (NERG) and Centre for Intellectual Property and Information Technology Law (CIPIT), Strathmore University

Caroline Wanjiru Muchiri
Advocate of the High Court of Kenya
Research Fellow, Centre for Intellectual Property and Information Technology Law (CIPIT), Strathmore University
Member, Open AIR New and Emerging Researchers Group (NERG)

Isaac Rutenberg
Senior Lecturer, Strathmore Law School, Strathmore University
Director, Centre for Intellectual Property and Information Technology Law (CIPIT), Strathmore University
Co-Investigator, Open AIR
irutenberg@strathmore.edu

The authors will be grateful for inputs and feedback on the contents of this Working Paper. Please send inputs to irutenberg@strathmore.edu.

Abstract

This paper sets out findings from research into innovation dynamics in the mobile technology ecosystem in the Kenyan capital Nairobi. The findings are drawn from a survey of 25 mobile tech startups, all but one of which were, at the time of the research, located at, or were linked to, one of Nairobi's numerous tech hubs. The survey results provide insights into the startups' approaches—in support of their innovation and enterprise development efforts—to open collaboration, human resource development, knowledge governance, and scaling.

Acknowledgements

This work was carried out by the Centre for Intellectual Property and Information Technology Law (CIPIT) at Strathmore Law School in Nairobi, under the auspices of the Open African Innovation Research (Open AIR) network. Open AIR is a partnership between Strathmore University, the University of Cape Town, the University of Johannesburg, the University of Ottawa, The American University in Cairo, and the Nigerian Institute of Advanced Legal Studies.

The authors acknowledge the support provided for this research by Open AIR, the Social Sciences and Humanities Research Council (SSHRC) of Canada, and the International Development Research Centre (IDRC). The views expressed in this work are those of the authors and do not necessarily represent those of the research funders. The authors wish to provide special thanks to Miriam Wanjiku Karanja for extensive reviewing and editing.

Keywords

mobile tech startups, tech hubs, innovation, collaboration, human resource development, knowledge governance, scaling, partnerships, networking, openness, informality, Nairobi, Kenya

I. Introduction

A. Context and Research Problem

For a number of years, Kenya has been projected as one of Africa's tech leaders, apace with Nigeria and South Africa (Kuo, 2016). Kenya has been hailed as the "epicentre of innovation" (Moime, 2016) in Africa, and has assumed the moniker "Silicon Savannah". It has been noted that, even more than in its "silicon sisters" (*The Economist,* 2012) Kenya's innovation scene is heavily based on technology for use on mobile handsets. Since the birth of the M-PESA mobile money app in Kenya in 2007, the country has grown into a buzzing environment for mobile application development, with many startups leveraging the M-PESA platform to create solutions in the financial services sector (Mwangi, 2017). Today, Kenya's mobile tech startups seek to develop solutions in a wide range of sectors, including not only financial services but also agriculture (Karuga, 2013), transport, entertainment, security, and health (Lawrence-Brown & Nieminen, 2016).

Startups in Kenya are, for the most part, micro and small enterprises (MSEs) as defined by the country's Micro and Small Enterprises Act of 2012 (hereafter "MSE Act"). This Act defines a "micro enterprise" as a firm, trade, service, industry or a business activity with two key characteristics,

namely: an annual turnover of less than KES500,000 (approximately USD4,900 in January 2020); and fewer than 10 employees. A "small enterprise" is defined in the Act as a firm, trade, service, industry, or a business activity with, an annual turnover of between KES500,000 and KES5 million (i.e., between USD4,900 and USD49,000); and between 10 and 50 employees (Republic of Kenya, 2012). For the research described in this Working Paper, we adopted a broad definition of a startup as: an enterprise that has been in existence for seven years or less, and that, in the words of Robehmed (2013), is "working to solve a problem where the solution is not obvious and success is not guaranteed".

Mobile tech startups, a subcategory of tech startups, are startup enterprises that use mobile telephony and mobile data technologies as the bases for platforms to provide products and services to consumers (McCormick, 2015). In Kenya, many mobile tech startups create solutions using both basic mobile phone platforms (i.e., so-called "low technology" such as short message service (SMS) and unstructured supplementary service data (USSD) (Bry, 2014)) and smartphone technologies. Kenya's mobile technology innovation scene has a strong focus on low technology and appropriate technology relevant to the Kenyan population (Bry, 2014). With over 90% of the Kenya population using a mobile phone handset (CAK, 2016), and with many of those handsets being feature phones rather that smartphones, the use of low-technology mobile applications enables startups to reach virtually the entire population.

The need for appropriate tech talent and skills is felt widely in the Kenyan startup ecosystem and in the broader economy. The Government of Kenya enacted the aforementioned MSE Act of 2012 in part to address this need, and as a step towards further implementation of Kenya's Vision 2030. Vision 2030 is Kenya's long-term blueprint and strategy for development, aiming to transform Kenya, by 2030, into a newly industrialising middle-income country providing a high quality of life for all its citizens (GoK, 2007). The blueprint recognises the need to strengthen startups and MSEs (GoK, 2007). The MSE Act recognises that startups drive innovation, with tech startups, including mobile startups, serving as particular drivers of innovation. These entities increase interest in, and boost the technology and innovation component of, the Kenyan economy, and they encourage investment in research and development (R&D), in line with Vision 2030.

The growth of any startup is highly dependent on its human resource capacity, which requires continuous growth and development. The founders, staff members, and interns are the core assets of startups, which typically operate on small budgets and with an intention to scale. The need to grow the capacity of the people within the startup, while at the same time delivering on the startup's objectives, can be seen as central to the "startup culture". This culture is adopted in "[a] workplace environment that values creative problem solving, open communication and a flat hierarchy" (Rouse, 2014). It provides an opportunity for the people working at the startup to grow organically with it, even if employees ultimately decide to exit the company and, in many cases, launch their own startups.

Innovative modes of knowledge governance—i.e., modes of knowledge-sharing and knowledge protection/appropriation—are key to the success of startups, and there is evidence to suggest that there is very little use of formalised intellectual property (IP) tools among Kenya's knowledge-based

businesses (Masinde, 2016; Rutenberg, 2013; WIPO, 2016). This was one of the elements we sought to explore with the research.

Among the many factors seen as responsible for the rapid development and uptake of mobile technology innovation in Africa—which is sometimes referred to as the "mobile continent" (see Hersman, 2013)—is the proliferation of technology hubs (hereafter "tech hubs") (Kaigwa, 2010). These spaces, which provide business support in the form of mentorship, office facilities, networking opportunities and seed funding, have been hailed as a key contributor to the growth of mobile technology on the continent (*The Economist*, 2012). The apparent need for such spaces has led to their rapid proliferation. In 2012, AfriLabs, an association of African innovation spaces, estimated the number of tech hubs on the continent at 70. Four years later, in 2016, studies placed the number of hubs in Africa in the range of 200 to 300 (World Bank, 2016). In October 2019, a study put the total at 643 (AfriLabs & Briter Bridges, 2019). We recognise the difficulty in comparing statistics generated by different studies, because of the varying methods used to classify and count hubs. Nevertheless, it is clear that there has been a substantial increase in the number of tech hubs and hub-like spaces on the continent.

In this Working Paper, we have deployed the categorisation of African tech hubs as proposed in De Beer et al. (2017), which posits the following three hub "archetypes":

- *cluster hub:* A small geographical region, e.g., a neighbourhood or urban corridor, containing a number of individual hub entities that frequently interact. Nairobi's Ngong Road is an example of a cluster hub, as it is home to iHub, Nailab, m:Lab East Africa and Nairobi Garage.
- *company hub:* An individual hub entity serving a particular community of innovators, "interacting with the outside world in a manner similar to a company" (De Beer et al., 2017, p. 250) and operating either as part of a cluster hub or in a more stand-alone fashion.
- *country hub*: "a more macro view of a hub, where an entire country or region advertises itself as a progressive hub, and government policies guide the actions of the country or region" (De Beer et al., 2017, p. 250).

Through tech hubs, mobile tech startups are able to receive support to move from the idea stage through to a minimum viable prototype stage, and then through to taking a product or service to market. One measure of startup success is fundraising. In 2014–15, Kenyan startups raised over USD47.4 million, with the funding coming from both local investors (such as mobile operator Safaricom) and international sources (Njonge, 2015). In 2019, Disrupt Africa reported that Kenya and Nigeria were the two top investment destinations within the African continent's tech ecosystem (Disrupt Africa, 2019). According to the report, Kenya received a total of USD122 million in funding during the previous year for its tech startups (Disrupt Africa, 2019).

The contribution to the Kenyan mobile startup scene by iHub, one of the country's pioneering hubs, has been singled out by numerous commentators, with iHub being lauded for, among other things, being a place for "techpreneurs" to come together, exchange ideas, and collaborate (*The Economist*, 2012). In late 2016, iHub announced, as part of a restructuring, its plan to set up an African Innovation Fund (AIF) to invest in startups across Africa, with USD10 million set aside for a pilot in Nairobi

(Jackson, 2016). At the time of celebrating its seventh anniversary in March 2017, iHub introduced several membership tiers—a departure from its previous looser model (Jackson, 2016) and an apparent attempt by iHub to make itself more commercially viable (a stepwhich could potentially serve as a marker for other tech hubs in Kenya and across the continent).

Another factor seen as central to the growth of mobile tech innovation in Kenya are the aforementioned M-PESA mobile money platform and the country's mobile money and financial technology (fintech) market in general (Mengistu & Imende, 2013; Pasquier, 2014; *The Economist*, 2012). Since the launch of M-PESA in 2007 and the subsequent opening of its API (application programme interface) to developers in 2015 (Mutegi, 2015), the Kenyan fintech sector has been transformed by the many startups that have developed new products and services around M-PESA. This phenomenon is expected to continue to spur innovations in this sector (Adongo, 2015). The M-PESA platform enables simplified payments on business-to-consumer (B2C), consumer-to-business (C2B), and business-to-business (B2B) bases (Finberg, 2015). According to statistics from the sector regulator, the Communications Authority of Kenya (CAK), mobile commerce transactions worth KES1.8 trillion (USD17.5 billion) were made over the period October to December 2018, and person-to-person transactions worth KES2.1 trillion (USD20.5 billion) were made during the same period (CAK, 2018b).

In addition to the rise of tech hubs and the impact of M-PESA, several other factors can be seen as contributing to Kenya's mobile tech revolution. First, the deregulation of the telecommunication industry, starting in 1999, led to the growth of Safaricom and its associated services, including M-PESA. Second, several socio-economic factors contributed to the explosive uptake of M-PESA and other mobile money transfer systems, including the low number of Kenyans with bank accounts (and, in turn, credit cards); the high number of Kenya's urban population who support relatives in rural areas; and the insecurity posed by transferring funds by hand or through intermediaries using bus transport (Mengistu & Imende, 2013). Third, government support, through strategic partnerships with the private sector and by linking users to broadband made available through connections to international undersea fibre optic cable projects, improved internet infrastructure and indirectly spurred innovation among developers (Mengistu & Imende, 2013). Statistics reveal that, as of June 2017, 40.5 million people in Kenya representing over 80% of the population had access to the internet, with the majority of users accessing internet through mobile devices (CAK, 2018a).

The research we describe and discuss in this Working Paper explored the approaches that Nairobi's mobile tech startups are taking—in support of their need to innovate and to grow their enterprises—to open collaboration innovation, human resource development, knowledge governance, and scaling.

B. Research Questions

In order to generate insights into matters of open collaboration innovation, human resource development, knowledge governance, and scaling in and among Nairobi's mobile tech startups, our survey questionnaire (see Appendix I) sought responses that would shed light on the following overarching questions:

- What is the nature of the collaborations within and among mobile tech startups during their innovation processes?
- What is the effect of these collaborations?
- In what ways do the startups share their knowledge?
- How do the individuals in the startups learn, or acquire knowledge, in the course of innovation processes?
- To what extent do the startups seek to use formalised IP tools to protect/appropriate their knowledge and innovations?
- How do the startups approach scaling of their enterprises?
- In which ways are the startups' approaches to scaling affected by their modes of interaction/collaboration and knowledge governance/appropriation?

II. Research Design

A. Methodology

The study made use of desk research to generate secondary data, and a survey questionnaire to produce primary data. In the desk research, basic information was gathered on all of the startups that could be traced to Nairobi tech hubs, with contact information stored for the purposes of sourcing respondents for, as outlined below, administration of a semi-structured survey questionnaire. The desk research also yielded important background information on the startup ecosystem in Kenya, including relevant reports, studies and news articles.

Based on the findings from the desk research, 25 startups in Nairobi were selected from the Ngong Road and Thika Road cluster hubs in the Kilimani area for primary data collection, with all of the selected startups being MSEs, and with each having some degree of relationship with a tech hub. Key resource persons at the startups were identified and contacted, and their inputs received through a semi-structured survey questionnaire administered via an in-person interview, a phone interview, an online video interview, or the respondent completion of the questionnaire online in Google Docs (see Appendix 1 for the questionnaire).

B. Sources of Primary Data

Table 1 below shows the sectors that the 25 survey respondents' startups operated in, the date on which the surveys were completed, and the survey mode used for each respondent.

Table 1: Respondents' Sectors, Survey Dates, and Survey Modes

Respondent number	Startup's sector(s)	Survey date	Survey mode
1	community development	9 March 2017	phone interview
2[1]	bitcoin, fintech	4 April 2017	online video interview

[1] This second response to the survey was provided cooperatively by two individuals from a single startup, with each responding to the questions relevant to their area of expertise.

3	software development	20 February 2017	in-person interview
4	software development	22 February 2017	in-person interview
5	health	3 March 2017	in-person interview
6	digital marketing	31 March 2017	in-person interview
7	healthcare	8 June 2017	phone interview
8	outsourcing solutions	3 March 2017	in-person interview
9	software development	26 May 2017	phone interview
10	restaurants, leisure	17 April 2017	online survey questionnaire
11	IT solutions, security	2 May 2017	online survey questionnaire
12	IT solutions, geospatial services	9 May 2017	online survey questionnaire
13	IT solutions, advertising	15 May 2017	online survey questionnaire
14	IT solutions, machine automation	18 May 2017	online survey questionnaire
15	IoT (internet of things)	23 May 2017	online survey questionnaire
16	healthcare	24 May 2017	online survey questionnaire
17	transport and route mapping	26 May 2017	online survey questionnaire
18	IoT (internet of things)	29 May 2017	online survey questionnaire
19	education	29 May 2017	online survey questionnaire
20	agriculture	30 May 2017	online survey questionnaire
21	real estate	6 June 2017	online survey questionnaire
22	fintech	9 June 2017	online survey questionnaire
23	healthcare	2 August 2017	in-person interview
24	healthcare	2 August 2017	in-person interview
25	fintech	3 August 2017	in-person interview

Table 2 shows the gender breakdown of the 25 respondents, and their roles in their respective startups.

Table 2: Respondents' Gender, Role/Position

Characteristics	**No. of respondents**	**% of respondents**
Respondent's gender		
Male	19	76%
Female	5	20%
Rather not say	1	4%

Respondent's role/position in startup		
Founder/CEO	13	52%
Technical Staff	7	28%
Director	2	8%
Other	3	12%

Table 3 shows key characteristics of the 25 startups that the respondents represented.

Table 3: Characteristics of the 25 Startups

Characteristics	**No. of startups**	**% of startups**
Number of employees in startup		
1–3	3	12%
4–6	8	32%
7–9	5	20%
10–12	2	8%
13–15	3	12%
16 and above	4	16%
Legal status of startup		
Sole proprietorship business	3	12%
Not-for-profit entity	1	4%
Limited liability partnership	2	8%
Limited liability company	19	76%
Location of startup in Nairobi [2]		
Ngong Road	3	12%
Kilimani	4	16%
Westlands	4	16%
Juja	2	8%
Thika Road (Kenyatta University)	3	12%
Madaraka Area (Strathmore University)	6	24%
No physical space (online-based)	1	4%
City Centre	1	4%
Upperhill	1	4%
Months/years since startup's establishment		
< 6 months	1	4%
6 months–1 year	3	12%
18 months–2 years	3	12%
24 months–3 years	4	16%
36 months–4 years	6	24%
48 months–5 years	4	16%
60 months–6 years	1	4%
72 months–7 years	3	12%

[2] Respondent 9's startup had offices both in Nairobi and outside Nairobi.

Company hub that startup was based at or involved with at time of research		
Metta	1	4%
iHub	5	20%
iBiz	6	24%
Chandaria BIIC	3	12%
KeMU Hub	1	4%
C4D Lab	2	8%
m:Lab East Africa	1	4%
Nairobi Garage	1	4%
Spring Accelerator	1	4%
Nailab	3	8%
Independent startup (not involved with any company hub)		
Respondent 13	1	4%

In the three sections that follow, we provide our findings in respect of the following four dimensions of the startups' innovation activities:

- open collaboration;
- skills development;
- knowledge governance; and
- scaling.

III. Open Collaboration

Open collaboration has been identified as a key engine for driving innovation in Africa, and tech hubs have been credited with the ability to foster collaboration-enabling environments where innovators can meet new people, find resources and investors, and test their business models (Pembroke, 2015). Since its onset, Nairobi's iHub has sought to build an innovation community committed to sharing and collaboration, and these objectives were also central to establishment of m:Lab in the same building as iHub (Gathege & Moraa, 2013). iHub seeks to create an environment for open innovation and collaboration among developers, academia, industry, venture capitalists, and investors (Gathege & Moraa, 2013). Its key vehicles for collaborative innovation are hackathons and competitions, during which ideas are openly shared. M-Farm and Rupu are among the startups that have materialised following such iHub events.

African tech hubs' culture of openness has generated support from many development partners, who believe that open collaboration holds the key to the success of startups in Africa, and who further believe that tech hubs can enable sustainable tech entrepreneurship. Starting a successful business has many obstacles, and the prevailing view is that no one can do it alone. It is believed that through collaboration, entrepreneurs can counter some of the inherent challenges of entrepreneurship (Pembroke, 2015).

To gauge the dynamics of open collaboration at the 25 startups, our survey focused on:

- location in relation to other startups;
- organisation of workspaces;
- manner of developing business ideas; and
- collaboration, in particular the manner of collaboration with other companies or external individuals; the benefits of collaboration; and limitations of the collaborations, if any.

A. Location

To establish the impact of location on open collaboration, we asked the respondents about the physical location of their startups and why they opted for the location. We found substantial evidence that the mobile tech entrepreneurs surveyed determined the location of their startups based on the location of other like-minded startups. This location could be either at a company hub or at another locality with a large startup population. The respondents from startups located at company hubs reported that in addition to providing affordable and serviced offices, the hubs offered numerous opportunities for networking and developing business ideas. These startups also relied on the open and interactive spaces within the hubs to meet new tech entrepreneurs and investors, access mentorship opportunities, remain aware of tech trends, and explore business and networking opportunities with other startups. Respondent 5 stated the following about why the respondent's startup was located at iBiz Africa company hub:

> iBiz Africa offers a platform where startups can share information, and the fact that [our] developers get to grow by sharing their challenges and technical problems with other developers at iBiz [is an added advantage]. This process [of interacting with other developers] helps our developers solve problems much faster.

A similar sentiment was provided by respondent 20, whose startup had had substantial interactions with various tech hubs:

> Involvement in accelerators and tech hubs has been a huge factor in our success. We met our first angel and institutional investors at the Village Capital accelerator, and have expanded the business through networks built at various accelerators and tech hubs.

Other respondents cited the networking opportunities offered by company hubs as crucial to business development—to such an extent that some startups would consider moving from one hub to another once opportunities at one hub had been exhausted. Respondent 6 stated:

> We have been at iBiz for the past two years, and feel that we have exploited all the networking opportunities, including getting business from other startups working at iBiz, and have saturated that window of opportunity. Moving to a workspace with a similar set-up, such as Nairobi Garage, would afford us more networking opportunities and a chance to interact with other startups at the hub, including competitors that are in the same space, so as to understand the dynamics at play.

For startups not physically located at hubs, we found that coexistence and interaction with other startups remained determining factors in their choice of location. Two startups indicated that they

were located in Westlands, a Nairobi suburb, because the area hosted many IT companies, hence allowing easy interaction and exploration of ideas. This demonstrated the importance of clustering among tech startups. In the words of respondent 4, from a startup located in the Ngong Road cluster hub:

> The area around Ngong Road and Kilimani is a cluster for tech hubs and tech startups. […] [We] had offices along Kilimani Road, Adams Arcade, and then moved to our current location on Ngong Road. [We] moved office as [we] scaled […]. The clustering of tech companies [increases] the ease of sharing experiences, networking, learning from shared experiences, and growing as a startup/company.

The majority of the respondents were of the view that ease of interaction with other startups determined their location.

B. Organisation of Workspaces

i. In Cluster Hubs

Of the 25 startups surveyed, 14 operated from their own offices but within cluster hubs; 10 operated in company hubs that were not part of cluster hubs; and one operated without any interaction with a hub.

All 14 of these startups linked to a cluster hub had open plan office set-ups in which teams—in particular the developer teams—were able to work openly and collaboratively. Here is how two of the respondents spoke about their startups' offices:

> [We] have an open work plan [space where] all teams are mixed and work collaboratively. (respondent 20)

> [The open office plan] provides the opportunity to network and collaborate with other startups that operate from iBiz. (respondent 8)

The startups among these 14 that carried out substantial amounts of fieldwork incorporated remote working environments, i.e., they tended to have physical meetings as a team only when necessary and to mostly communicate using online tools such as Slack, Scrum Agile, Basecamp, and e-mails.

Two of the 14 startups had opted for closed offices for their senior management but an open plan area for tech developers, allowing developers to easily share ideas and collaboratively solve technical problems. Respondent 18's startup had its offices in a townhouse, where its founders also lived, which had an open plan office set-up. Respondent 21's startup had been hosted in an incubator hub that had shared offices. As the startup grew in size, it needed more space, and it opted to move to a private space where it could establish its own company culture. In the new space, it had adopted

> [an] open office setup, [but also] with separate quiet/thinking rooms. (respondent 21)

ii. In Company Hubs

The 10 startups located within company hubs that were not part of cluster hubs were found to have embraced the concept of open working places, on the grounds that such spaces created an environment where their team members were able to openly interact and share ideas.

C. Development of Business Ideas

Our survey found that the startups typically developed business ideas aimed at solving the problems of a specific target market. That is, the startup would identify and select a target market first, and then seek to solve a problem in that market—as opposed to developing a solution first and then seeking a target market for the solution. In the words of respondent 20, from a startup targeting the agricultural sector:

> Typically, business ideas are ideated to solve a problem; either one we are facing or one our customers are facing. We ideate collaboratively, implement, test and refine the solution.

We found that the respondents generally saw their startups' business idea-generation processes as being collaborative, and typically following one of the following three approaches:

- spontaneous approach;
- human-centred design; or
- lean canvas technique.

i. Spontaneous Approach

Six respondents indicated that their startups were spontaneous in their formulation of business ideas—simply working on any idea that arose, without adopting a formal process. In the words of respondent 12:

> [When] any idea comes up, we SWOT it [conduct a strengths, weaknesses, opportunities, threats analysis], do market research, [then] work on it.

Other interviewees stated that their startups initially formulated business ideas spontaneously, but thereafter followed more formal processes to determine the ideas' viability. According to respondent 2:

> When an idea is pitched, a few of the team members will see if the idea is viable, and when the idea is deemed viable, they will map out the implementation of the idea into different phases. There is a communal system of sharing business ideas.

ii. Human-Centred Design

Ten respondents stated that their startups primarily generated ideas from observation of the needs of potential customers, i.e., a human-centred design process. Respondent 18 explained the process as follows:

> We do customer research by building simple websites, marketing them and seeing how much interest they pull from potential customers.

Respondent 4 explained the process in this way:

> Ideas would come from customers and the solutions created are bespoke solutions to cater for the clients' needs. The process to create these bespoke solutions involves requirement-gathering, analysis of the client's legacy system, and the development of a proposed solution to solve the customer's pain point.

iii. Lean Canvas Technique

We found that four of the surveyed startups utilised elements of the lean canvas technique to develop business ideas. This technique involves team members collectively brainstorming ideas, capturing the ideas on a one-page canvas or flipchart, and then writing down a model for implementation of the ideas (Maurya, 2012). The model adopts a nine-block concept (Maurya, 2012) consisting of the:

- top three problems facing the target market;
- top three solutions to the problem;
- value propositions of identified solutions;
- key metrics that will be used to measure performance;
- target customers;
- ways to reach target customers;
- cost structure;
- revenue streams; and
- startup's unfair advantage (the factors that make the startup difficult to copy, including insider information, the right "expert" endorsements, a dream team, personal authority, large network effects, community, existing customers, and search engine optimization (SEO) ranking).

In the words of respondent 21, whose startup was in the real estate sector:

> We use the lean canvas to brainstorm, and the validation board to experiment/go to market.

Respondent 2, whose startup was in the bitcoin and fintech sector, spoke of the startup's brainstorming sessions in the following terms:

> When an idea is pitched, a few of the team members at [the startup] will see if the idea is viable, and when the idea is deemed to be viable, they will map out the implementation of the idea into different phases. There is a communal system of sharing business ideas.

D. Modes of Collaboration

We found that the surveyed startups followed a variety of modes of collaboration, with many preferring online modes. One such mode, used by four of the surveyed startups, was the "scrum"

methodology—an agile framework "within which people can address complex adaptive problems while productively and creatively delivering products of the highest possible value" (Scrum.org, n.d.).

Five of the startups surveyed were found to be using online collaboration tools such as Slack, Jira, Trello, Basecamp, email and WhatsApp. From the responses received, it was found that the preference for these communication modes was a function of them having the necessary flexibilities, i.e., they allowed a mixture of on-site and remote working by the startups' founders, staff members (both part-time and full time), interns, and collaborators hired for specific tasks, such as software development.

All the surveyed startups were also found to be collaborating externally with other (non-rival) startups and individuals through various means, such as joint ventures, strategic partnerships, consultancies, and contractual arrangements, in an effort to deliver on mutually beneficial projects. For respondent 20's startup, external collaborations were with a mix of both permanent partners and partners with whom the startup engaged on an "as-needed" basis. In the words of respondent 20, submitted via the online survey questionnaire:

> We have an extensive partnership ecosystem of organizations including data suppliers, farmer organizations, development organizations, and financial institutions. We also engage with external consultants on an ad hoc basis.

As respondent 21 wrote in the online questionnaire:

> We have working agreements with various service providers, e.g truck owners who we hire their trucks from at a fairer rate, in exchange for providing them access to our tech team for consultation and server space.

E. Benefits of Collaboration

All respondents reported that collaboration was adding value to their startups' work.

i. Access to Resources

Collaboration by and within the startups was said to enable access to resources which would otherwise not be available to the startup, for reasons of cost or other barriers. In the words of respondent 13:

> The companies we have collaborated with have a wide reach across the African continent. They will play an important role in allowing us to scale faster, a process that would have taken a long while if we were to pursue these avenues ourselves.

According to respondent 20:

> Collaboration allows us to remain a lean team, while accessing the resources and expertise we need to succeed.

In the words of respondent 21 in the online questionnaire:

> We get resources we wouldn't be able to afford weren't it for collaboration.

And in the words of respondent 16:

> Collaboration reduces risks, shares resources, [and] improves expertise.

ii. Opportunities for Learning and Knowledge-Sharing

Respondent 14's startup had found that collaboration enabled it to learn new things from their partners, especially in respect of the innovation process.

Respondent 17's startup had benefitted from collaboration

> […] through sharing of different ideas [and] approaches to growth.

Respondent 19 stated that the main benefit of collaboration was that

> [t]here are partners who come to complement our weakness with their strengths.

iii. Public Relations

Respondent 15's startup had found it beneficial and cost-effective to collaborate with public relations companies who could boost the startup's public image and engage in community service work that the startup would not have otherwise been able to successfully perform.

iv. Scaling

Respondent 22's startup found creation of new revenue streams or product lines to be a benefit of collaboration. Respondent 13's startup was planning to enter into more markets in Africa, and had entered into partnerships with companies which could assist the startup in reaching this objective.

Matters of scaling are discussed in more detail in the dedicated "Scaling" findings section below.

v. Networking and Funding Opportunities

It was found that through collaboration with tech hubs and private-sector entities, the startups were able to participate in various programmes and to source funding and capital support. An example of such a programme was found to be the Safaricom Foundation Technology for Good accelerator programme, through which selected startups are able to receive training, mentorship and seed funding.

F. Collaboration's Potential Limitations

Respondent 13's startup had benefitted from collaborations, but at the same time, the respondent voiced a concern that collaboration was likely to slow down product development, because the number of decision-makers had increased.

Respondent 18's startup, having entered into arrangements for service delivery to other companies, had suffered some loss of business when one of those companies suddenly discontinued a contract.

Respondent 23's startup had experienced challenges in working with some non-governmental organisations (NGOs) and with Kenyan County governments, due to collaborations being halted—as a result of lack of consistent funding or a termination of funding. For example, there had been cases where a Kenyan County government had pulled out of a programme or failed to dispatch funds, after a project implementation process had already begun or was even complete.

Respondent 16 expressed the view that some collaborations served to limit the startup's involvement with other potential partners.

It was also found that some of the startups had experienced what they regarded as misappropriation of their ideas by other startups with which they were collaborating, or by individuals with whom they were collaborating inside their startup.

See more discussion of knowledge appropriation/protection in the "Knowledge Governance" findings section below.

In the words of respondent 20, provided via the online questionnaire:

> We have previously had discussions with potential collaborators/team members who were thinking about similar products who then went on to start a company with similar aspects to our work.

However, among the 25 startups surveyed, only six were found to have made use of non-disclosure agreements (NDAs) to protect their knowledge, and a majority (13) had not yet engaged in any form of formalised knowledge protection/appropriation, such as trademarks, patents, utility models, and copyrights.

IV. Human Resource Development

A majority of the respondents stated that there was a shortage of local tech talent in the Nairobi mobile tech ecosystem, especially in the area of software development.

A. On-the-Job Practical Training

It was found that on-the-job training, sometimes supplemented by use of free online training resources, was the mode of human resource development preferred by the mobile tech startups. This preference was apparently a result, to some extent, of the startups operating under tight financial conditions while seeking to grow and scale.

On-the-job training was said to help interns and employees at the startups to create customised solutions, as the skills gained were based on hands-on experience in the tech industry. Such training was said to also be a useful way to ingrain organisational culture, create cohesiveness, provide the

practical skills required, offer a holistic view of the startup's goals, business model and outlook, and help to ensure that the startup's product development was customer-centric. In the words of respondent 13, provided via the online questionnaire:

> [We] prefer on-the-job training and collaboration through learning. It offers a fulfilling experience for us. It also serves as an important avenue to spread the company culture while offering our interns a chance to grow from the ground up.

It has been argued that startups seeking to develop their human resources need to leverage the skills of current employees by getting them to serve as trainers (Bahrami, 2016). This argument was borne out by the approach being taken at respondent 23's startup, at which one of the founders had developed course content for a training programme. The programme was designed to be practical and strongly targeted towards the specific needs of the startup's trainees.

It also has been observed that startups face a unique challenge in training their employees on "bootstrapped" budgets and that, accordingly, free-of-charge online training is a powerful employee-training tool that startups often employ (Bahrami, 2016). Indeed, respondent 14's startup was using YouTube Tutorials for any "heavy training" that members needed. Respondent 18's startup also used YouTube videos as an online training resource, as well as free online courses carried on massive open online course (MOOC) platforms such as Coursera and EdX.

It was found that training played an important role in product development at the startups—serving, in the words of respondent 13,

> […] as an avenue to innovate around existing products while coming up with new ideas and processes.

According to respondent 15,

> [w]e observed that training programmes also make the members of the startup more resourceful, as well as better equipped to handle specific tasks that in turn would enable the members of the startup to access their skills and knowledge in providing innovative client-based solutions. The training has also proved to be very useful to the members of the startup in the competitive tech industry.

Respondent 21 cited the empowerment dimension of training offered to employees:

> […] training not only helps them get better at their individual roles, but also empowers their decision-making capabilities in their own personal lives.

B. Gaps in Formalised Tertiary Education

From the responses received, we found that there appears to be a gap between the skills needed in the market and those possessed by developers coming out of formalised tertiary education institutions, i.e., universities and colleges. Respondent 17 stated that the knowledge acquired by university graduates during their formal education was

> […] very theoretical and not practical enough.

Several respondents voiced the need for tertiary qualifications to be supplemented by practical skills training.

In the words of respondent 24:

> Formal education does not prove useful when running a startup.

According to respondent 7:

> The training offered [at respondent 7's startup] is more hands-on, i.e., more practical. Despite the interns/students being in their final year of study [at university], they lack the hands-on skills required in the marketplace, which is very worrying. The students possess a lot of theoretical knowledge as opposed to practical skills.

In addition to the aforementioned on-the-job practical training being provided by the startups, another response to the need for more practical skills in the Nairobi mobile tech ecosystem would appear to be the short course offerings of Moringa School and Gebeya, both of which focus on practical training for developers (Gebeya, n.d.; Moringa School, n.d.). These institutions pledge to equip developers with the necessary practical skills via hands-on training, and in a much shorter period of time than the four years needed to complete a formal tertiary degree.

V. Knowledge Governance

We found that, among the 25 mobile tech startups whose representatives we surveyed, seven had copyright registrations (though copyright registration is not mandatory in Kenya), two had pending patents applications, five had trademarks, one had a trade secret, and six had utilised non-disclosure agreements (NDAs)—while 13 had not implemented any formal IP protection.

According to respondent 5, the value of IP to the startup's business was to protect against copycats utilising their ideas, both startups and more established companies.

In the words of respondent 4:

> We put a lot of resources from the business's finances to develop products that are aimed for the mass market, so intellectual property protection provides a way for us to protect our long-term interests and avoid anyone else ripping-off our products for their own benefits. IP adds to the value of the whole company, like having patented solutions could increase the value of the company when it comes to valuation.

The startup represented by respondent 7 had found the registration process of trademarks and patents to be quite slow, and had concluded that its interactions with the Kenya Industrial Property

Institute (KIPI) were not a good use of time and resources. The startup had also approached the IP office of a local university to assist in the application process, but found the process too involved. Generally, the perception of most startups in the study was that the patent registration process, in particular, was long, complicated, and expensive. Similar concerns were raised about the trademarking process.

Some respondents cited the challenge of trying to find a balance between spending on IP registration and spending on product development. Respondents 23 and 25 were of the view that their startups' resources were better spent on product development and on scaling the business than on IP protection, which was a "secondary" priority—although they acknowledged the importance of their startups protecting their IP. Two other respondents noted that in the case of work done under a contract for hire, IP protection was the client's concern.

An issue raised by respondent 8 was that IP protections, and patents in particular, do not necessarily have the effect of stopping competitors from creating similar products and entering the market in which you trade. Addressing the specific context of mobile technology, respondent 8 stated:

> Take the example of Uber. [They] can't say that they're the only ones who can make an app for cabs, because now there's Easy Taxi, Mondo [...]. So, we haven't really thought of patenting anything because, you know, information technology is based on growth: make something better and sell it.

Respondents 3, 7 and 25 stated that for their startups, the first-mover advantage (see Oyebode, 2014) was more important for scaling up and growth than patent protection. These respondents cited branding and marketing (and by extension, trademarks) as integral to seizing first-mover advantage. As respondent 25 explained:

> As far as we know, there's no clear way to protect your knowledge or know-how. So how we [do it] is, we execute faster, before somebody else.

Similarly, respondent 7 stated that in the world of technology, time is of the essence, so rather than "waste time" with patent protection, the aim of the respondent's startup was to "develop things and move first/fast into the market".

Table 4 provides a picture of what the 25 respondents said were the modes of knowledge appropriation, and efforts at competitive advantage, used by their startups.

Table 4: Startups' Modes of Knowledge Appropriation/Protection and Pursuit of Competitive Advantage

Modes of knowledge appropriation/protection used by startup	**No. of startups**	**% of startups**
None	13	38%
Copyrights	7	21%
Trademarks	5	15%
Trade secrets	1	3%
Patents (pending applications)	2	6%

Non-disclosure agreements (NDAs)	6	18%
Means used to compete with rival firms		
Superior quality and affordability	8	32%
First-mover advantage	5	20%
Branding and marketing	4	16%
Product innovation	8	32%
Collaborations	0	0%

VI. Scaling

The startups were found to be seeking scale through, among other things, enlarging their product ranges (e.g., by developing and commercialising new products), opening more outlets, entering new markets, and increasing their number of employees. For example, respondent 23's startup at first offered its services for free, and later began charging a subscription fee. The startup was now launching new products that it intended to sell to its subscribers in order to increase the capacity of the company to scale.

We saw above, in the "Open Collaboration" findings section, evidence of startups designing their modes of collaboration to best suit their scaling efforts.

Respondent 22's startup found collaboration to be of great value in the pursuit of scaling, as it created new revenue streams and product lines. In the words of respondent 13:

> The companies we have collaborated with have a wide reach across the African continent. They will play an important role in allowing us to scale faster, a process that would have taken a long while if we were to pursue these avenues ourselves.

Respondent 9's startup had changed its collaboration structure in order to pursue scaling. Initially the team at the startup worked jointly and collaboratively on a single project. In order to scale, the team had split themselves into four teams of two each, to head four different projects simultaneously. This included projects taking place outside Nairobi, including one in the town of Eldoret in western Kenya where they established a second office.

We also saw above, in the "Knowledge Governance" findings section, that respondents 23 and 25 viewed expenditure on efforts at product development and scaling as a better focus of expenditure than IP protection. And in the same vein, respondents 3, 7 and 25 saw pursuit of first-mover advantage (see Oyebode, 2014) as more valuable to scaling than the pursuit of patent protection.

We also found that some startups had changed their business models in order to scale. For example, respondent 25's startup had pursued one business model for three years, but had then opted to adapt the model in order to scale the company. In the first business model, respondent 25's startup had partnered with service providers to increase the service providers' sales, using a discounted card developed by the startup. The focus for the startup under this first business model was to ensure that many people took out the card and used it in their listed service providers' outlets. The second

business model involved a shift to a mobile point-of-sale solution which, according to respondent 25, proved much more amenable to scaling. In the words of respondent 25,

> […] we decided to pivot into a mobile point-of-sale [product], in the form of a mobile app that enables businesses to capture sales and purchases, record their expenses, and manage their stock.

VII. Conclusions

We now conclude with some observations that emerged from the findings in respect of three cross-cutting themes:

- openness;
- networking; and
- informality.

Openness was found to be at the heart of Nairobi's mobile tech ecosystem, as exemplified by the startups' organisational set-ups, physical spaces, processes for developing business ideas, and modes of learning and knowledge-sharing. The approaches to knowledge governance adopted by the startups collectively supported interaction and open collaboration, both internally and with third parties. This created a culture of open collaboration by the startups, as observed in this study. We consider the culture of open collaboration by the startups key for scaling up as it allows them to optimise their business models while not losing sight of their specific product and service offerings. Further, open collaboration facilitates networking and funding opportunities for the startups and enables further skills development for team members. It is important to state that in respect of knowledge governance, some of the startups combined elements of both openness and protection, i.e., they considered certain aspects of their business knowledge to be open to all others, while other aspects were either confidential or closely guarded with IP protections in place or being sought.

The role of *networking* in the survival of startups was a feature in the findings from all of the questionnaire respondents. Tech hubs were found to be the primary sources of networks for most of the startups interviewed, where they connected the startups to each other, to investors, and to other strategic partners. Partnerships through networking were identified as being the main force behind: collaborations between developers and entrepreneurs; peer-to-peer learning; on-the-job skills training; and knowledge-sharing.

In respect of the third cross-cutting factor, *informality*, since the advent of M-PESA, the mobile technology space in Kenya has witnessed an upsurge in mobile tech innovations driven largely by self-employed or part-time/freelance developers located within or around tech hubs. This represents a manifestation of the power of informal innovation in Kenya. It must be noted that some of these developers have engaged in limited formalisation of certain aspects of their business, e.g., through company registration; full-time employment for team members; written contracts with clients and consultants; NDAs for third parties; and use of the IP system. Thus, there is evidence of bridging between, and harnessing of, both informal and formal modalities. This bridging of informal and

informal elements was also found in respect of the startups' human resource development, with almost all of the startups in the study emphasising the need to supplement formal education for their team members with practical, and largely informal, on-the-job skills training.

References

Adongo, L. E. (2015, September 20). Why fintech developers should pay attention to the opening of M-PESA's API [Blog post]. FSD Kenya. Retrieved from http://fsdkenya.org/blog/why-fintech-developers-should-pay-attention-to-the-opening-of-m-pesas-api-2/

AfriLabs, & Briter Bridges. (2019). *Building a conducive setting for innovators to thrive: A qualitative and quantitative study of a hundred hubs across Africa.* Retrieved from https://static1.squarespace.com/static/5ab2a4d655b02c29746fc58c/t/5db6ec5fc494f4106d713e26/1572269613096/4.0_AFRILABS_REPORT+FINAL-compressed.pdf

Bahrami, R. (2016, May 11). 4 powerful employee training tips for startups [Blog post]. Retrieved from http://blog.capterra.com/4-powerful-employee-training-tips-for-startups/

Boateng, P. (2015, April 14). Africa needs IP protection to build knowledge economies. *SciDevNet*. Retrieved from http://www.scidev.net/global/intellectual-property/opinion/africa-needs-ip-protection-build-knowledge-economies.html

Bowmans. (2012). Kenya's Vision 2030: Creating more dinner space for SMEs on the IP table. Retrieved from http://www.bowmanslaw.com/insights/kenyas-vision-2030-creating-more-dinner-space-for-smes-on-the-ip-table/

Bright, J. (2016, December 9). Africa's tech hubs. *TechCrunch*. Retrieved from https://techcrunch.com/2016/12/09/africas-tech-hubs/?utm_content=buffer470f8&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer:

Bry, N. (2014). Frugal innovation in Africa: Low-tech for creative mobile services [Blog post]. Seedstars. Retrieved from http://www.seedstarsworld.com/blog/2014/12/frugal-innovation-africa-low-tech-creative-mobile-services/

Communications Authority of Kenya (CAK). (2016). *Quarterly sector statistics report: Fourth quarter for the financial year 2015-2016 (April-June 2016)*. Retrieved from https://ca.go.ke/wp-content/uploads/2018/02/SECTOR-STATISTICS-REPORT-Q4-2015-2016.pdf

CAK. (2018a). *2016-2017 Annual Report*. Retrieved from https://ca.go.ke/wp-content/uploads/2018/04/Annual-Report-for-the-Financial-Year-2016-2017.pdf

CAK. (2018b). *Fourth quarter sector statistics report for the financial year 2017/2018 (April–June 2018)*. Retrieved from https://ca.go.ke/wp-content/uploads/2018/10/Quarter-Four-sector-statistics-report-for-the-Financial-Year-2017-18.pdf

Comins, N. R., & Kraemer-Mbula, E. (2016). *Innovation hubs in Southern Africa*. In O. Adesida, G. Karuri-Sebina, & J. Resende-Santos (Eds.), *Innovation Africa* (pp. 37–98). Bingley, UK: Emerald.

De Beer, J., Millar, P., Mwangi, J., Nzomo, V., & Rutenberg, I. (2017). A framework for assessing technology hubs in Africa. *N.Y.U. Journal of Intellectual Property and Entertainment Law*, *6*(2), 237–277.

De Beer, J., Armstrong, C., Oguamanam, C., & Schonwetter, T. (2014). Current realities of collaborative intellectual property in Africa. In J. De Beer, C. Armstrong, C. Oguamanam, & T. Schonwetter (Eds.), *Innovation and intellectual property: Collaborative dynamics in Africa* (pp. 378-384). Cape Town: UCT Press.

Disrupt Africa. (2019). *Funding report*. Retrieved from https://disrupt-africa.com/funding-report/

Finberg, R. (2015). M-Pesa opens up to 3rd party developers in Kenya as Safaricom launches API. *Finance Magnates*. Retrieved from http://www.financemagnates.com/fintech/payments/m-pesa-opens-up-tp-3rd-party-developers-in-kenya-as-safaricom-launches-api/

Firestone, R., & Kelly, T. (2016, August 24). The importance of mapping tech hubs in Africa, and beyond [Blog post]. Retrieved from http://blogs.worldbank.org/ic4d/importance-mapping-tech-hubs-africa-and-beyond

Gathege, D., & Moraa, H. (2013). *ICT hubs model: Understanding the key factors of the iHub model, Nairobi, Kenya.* Retrieved from https://pdfs.semanticscholar.org/84e4/003ae1324b9001c09b543628a0144b8c4aea.pdf

Gebeya. (n.d.). Website Retrieved from http://gebeya.com

Government of Kenya (GoK). (2005). Sessional Paper No 2 of 2005: Development of Micro and Small Enterprises for Wealth and Employment Creation for Poverty Reduction.

Government of Kenya (GoK). (2007). Kenya Vision 2030. Retrieved from http://www.vision2030.go.ke/vision

GSM Association (GSMA). (2016, August 5). A few things we learnt about tech hubs in Africa and Asia. Ecosystem Accelerator. Retrieved from http://www.gsma.com/mobilefordevelopment/programme/ecosystem-accelerator/things-learned-tech-hubs-africa-asia

Hersman, E. (2013). The mobile continent. *Stanford Social Innovation Review*. Retrieved from https://ssir.org/articles/entry/the_mobile_continent#

Jackson, T. (2016, December 16). Kenya's iHub to launch investment fund for African startups. Disrupt Africa. Retrieved from http://disrupt-africa.com/2016/12/kenyas-ihub-to-launch-investment-fund-for-african-startups/

Kaigwa, M. (2010, August 20). 20 Kenyan web and tech innovations worth watching. Memeburn. Retrieved from http://memeburn.com/2010/08/20-kenyan-start-ups-worth-watching/

Kalanje, C. M. (2015). *Role of intellectual property in innovation and new product development.* World Intellectual Property Organisation (WIPO). Retrieved from https://www.wipo.int/sme/en/documents/ip_innovation_development_fulltext.html#role

Karuga, J. (2013). M-Farm: Giving Kenyan farmers the right connections. *New Agriculturalist*. Retrieved from http://www.new-ag.info/en/developments/devItem.php?a=2909

Kemibaro, M. (2015, December 27). Kenya's biggest technology trends from 2015. Retrieved from http://www.moseskemibaro.com/2015/12/27/kenyas-10-biggest-technology-trends-from-2015/

Kieti, J. (2013, March 1). Working with intellectual property rights in East Africa. Retrieved from https://ihub.co.ke/blogs/12389/working-with-intellectual-property-rights-in-east-africa

Kohli, T. (2015, February 19). Why Kenya, home to Africa's 'Silicon Valley' is set to be the continent's ultimate tech hub. Retrieved from http://mgafrica.com/article/2015-02-19-why-kenya-is-africas-tech-hub

Kuo, L. (2016, January 12). Silicon Savannah: African startups are defying the global tech slowdown. *Quartz Africa.* Retrieved from https://qz.com/592119/african-startups-are-defying-the-global-tech-slowdown/

Lawrence-Brown, A., & Nieminen, M. (2016, May 10). How Kenyans are embracing mobile technology to access healthcare. Retrieved from https://www.theguardian.com/sustainable-business/2016/may/10/how-kenyans-are-embracing-mobile-technology-to-access-healthcare

Masinde, J. (2016, November 2). It's about to get easier for African innovators to protect their inventions. Retrieved from https://qz.com/825393/microsoft-4afrika-is-supporting-african-ip-registration-and-innovators-across-africa/

Maurya, A. (2012). *Running lean: Iterate from plan A to a plan that works*. Boston: O'Reilly Media.

McCormick, C. (2015, December 4). What is the difference between a tech startup and a startup that has a web and mobile smartphone presence? Retrieved from https://www.quora.com/What-is-the-difference-between-a-tech-startup-and-a-startup-that-has-a-web-and-mobile-smartphone-presence

Mengistu, A., & Imende, S. (2013, January-February). Kenya's mobile tech revolution. *Selamta.* Retrieved from http://www.selamtamagazine.com/stories/kenyas-mobile-tech-revolution

Moime, D. (2016, April 25). Kenya, Africa's Silicon Valley, epicentre of innovation [Blog post]. Retrieved from https://vc4a.com/blog/2016/04/25/kenya-africas-silicon-valley-epicentre-of-innovation/

Moraa, H., Murage, K & Omenya, R. (2012). *Perceptions from tech startups in Kenyan ICT hubs*. iHub Research. Retrieved from http://ihub.co.ke/ihubresearch/uploads/2012/november/1354025437_819_126.pdf

Moringa School. (n.d.). About. Retrieved from http://moringaschool.com

Musimbi, S. (2012, July 18). Kenya's M-PESA technology and emerging intellectual property issues. Retrieved from http://www.caymanfinancialreview.com/2012/07/18/Kenya%E2%80%99s-M-PESA-technology-and-emerging-intellectual-property-issues/

Mutegi, L. (2015, September 18). Safaricom finally opens M-PESA APIs to developers. Retrieved from http://cio.co.ke/news/main-stories/safaricom-finally-opens-m-pesa-api-to-developers

Mwangi, J. (2017, April 17). Mobile innovation as the cornerstone of socio-economic development in Kenya. Retrieved from https://blog.cipit.org/2017/04/17/mobile-innovation-as-the-cornerstone-of-socio-economic-development-in-kenya/

Njonge, K. (2015). Kenyan startups funded in 2014/5. Tech Sahara. Retrieved from http://techsahara.com/kenyan-startups-funded-in-201415/

Nsehe, M. (2011, August 2). The best African mobile apps: iCow. *Forbes.* Retrieved from http://www.forbes.com/sites/mfonobongnsehe/2011/08/02/the-best-african-mobile-apps-icow/#70bd72f71934/

Organisation for Economic Co-operation and Development (OECD). (2016). No country for young firms? STI Policy Note. Retrieved from https://www.oecd.org/sti/ind/Policy-Note-No-Country-For-Young-Firms.pdf

Oyebode, A. (2014, January 15). M-Pesa and beyond – Why mobile money worked in Kenya and struggles in other markets. Retrieved from https://vc4a.com/blog/2014/01/15/m-pesa-and-beyond-why-mobile-money-worked-in-kenya-and-struggles-in-other-markets/

Pasquier, M. (2014). Entering Kenya's mobile market. Innovation is Everywhere. Retrieved from http://www.innovationiseverywhere.com/mobile-market-kenya/

Pembroke, B. (2015). No one can do it alone: Open collaboration to power the next generation of African ventures. *Huffington Post*. Retrieved from http://www.huffingtonpost.co.uk/beatrice-pembroke/noone-can-do-it-alone-ope_b_7906372.html

Pivoteast. (2013, March 01). John Kieti Transitions from the m:Lab. Retrieved from http://pivoteast.com/pivot/john-kieti-transitions-mlab/

Republic of Kenya. (2012). Micro and Small Enterprises Act, No. 55 of 2012. Retrieved from http://www.industrialization.go.ke/index.php/policies/99-micro-and-small-enterprises-act-2012

Robehmed, N. (2013, December 16). What is a startup? *Forbes*. Retrieved from http://www.forbes.com/sites/natalierobehmed/2013/12/16/what-is-a-startup/#3d176f424c63

Rodman, J. (2016, October 20). Collaborative workplaces: What startups can teach large companies [Blog post]. Retrieved from www.insights.wired.com/m/blogpost?id=6544125%3ABlogpost%3A142650

Rouse, M. (2014, June). Startup culture. TechTarget. Retrieved from http://searchcio.techtarget.com/definition/startup-culture

Rutenberg, I. (2013, October 29). Faking it: Time to rethink intellectual property in developing countries? *The Guardian*. Retrieved from https://www.theguardian.com/global-development-professionals-network/2013/oct/29/intellectual-property-rights-google

Scrum Alliance. (n.d.). Why scrum? Retrieved from https://www.scrumalliance.org/why-scrum

Scrum.org. (n.d.). What is scrum? Retrieved from https://www.scrum.org/resources/what-is-scrum

The Economist. (2012, August 25). Upwardly mobile: Kenya's technology start-up scene is about to take off. Retrieved from http://www.economist.com/node/21560912/

User Testing. (2018, December 5). IDEO's human centered design process: How to make things people want [Blog post]. User Testing Blog. Retrieved from https://www.usertesting.com/blog/how-ideo-uses-customer-insights-to-design-innovative-products-users-love/

Viffa Consult. (2015, May 15). Intellectual property: A case review of Kenya's IT sector. Retrieved from http://viffaconsult.co.ke/intellectual-property-a-case-review-of-kenyas-it-sector/

Wahu, A. (2017, February 9). What Moringa School taught me that campus did not [Blog post]. Retrieved from https://moringaschool.wordpress.com/2017/02/09/what-moringa-school-taught-me-that-campus-did-not

Wanjohi, N. (2014, February 5). Finding the right intellectual property lawyer for your innovative venture. Afromum. Retrieved from http://www.afromum.com/finding-the-right-intellectual-property-lawyer-for-your-innovative-venture/

World Bank. (2016). *Tech hubs and incubators in Africa*. Retrieved from http://pubdocs.worldbank.org/en/765531472059967675/AFC42460-081716.pdf

World Intellectual Property Organisation (WIPO). (2016). *IP facts and figures 2016*. Retrieved from http://www.wipo.int/edocs/pubdocs/en/wipo_pub_943_2016.pdf

Appendix I: Data Collection Instrument

Questionnaire (used for interviews and for online survey)

Open Collaborative Models of Mobile Tech Innovation in Kenya

1. Name of startup?
2. Name of interviewee? Position at startup?
3. Date of establishment of the startup?
4. How long has your startup been in operation?
5. Location of the startup and why?
6. Has your startup had offices in another location/other locations? If so, what were the reasons behind your startup having offices at these other locations and what was the reason for your re-location to your current offices/office space?
7. How is your office space organised for teams at work?
8. Type of registration of the startup? (business, company, LLP etc.)
9. Details of founders of the startup? (e.g., name, designation, level of education, expertise, age, gender)
10. Has the structure of your startup changed since the company was founded? (e.g., change in management, have some of the founders left the company? etc.)
11. Total number of staff at the startup?
12. What problem(s) does your "mobile tech" startup aim to solve and how?
13. What is your startup's leading product/service?
14. Do you consider yourself to be in the mobile tech space and why?
15. Has your startup had any interaction/involvement with any tech hub(s), e.g., incubator, accelerator, co-working space? Why?
16. How has any interaction/involvement with any tech hub(s), e.g., incubator, accelerator, co-working space, affected your startup? Why?
17. Typically, how are business ideas developed and tested at your startup?
18. Typically, how are intangible business assets (know-how, ideas, and processes) protected at your startup?
19. Typically, how is business knowledge shared at your startup among the core staff members and other staff members/consultants that work in conjunction with your startup?
20. Typically, how is customer business knowledge shared at your startup?
21. Does your startup have any contracts in place with its core team and other staff, etc.?
22. Does your startup have any contracts in place with customers?
23. Does your startup have any contracts in place with business partners?
24. How do you collaborate with other companies or external individuals in your operations?
25. Does your startup have competitors? If so, how does it maintain a competitive edge?
26. Does your startup have copycats? If so, explain with examples of how you deal with copycats.
27. How does your startup generate revenue?
28. How does your startup plan to scale up its business?
29. How does your startup plan to make its business sustainable?
30. What types of funding has your startup received? If so, what percentage of total expenditure is accounted for by external funding?

31. What means do you use to protect your innovation(s)?
32. Do you employ any intellectual property protection in your startup? Why? Why not? Which types? How?
33. What is your perception of the value of intellectual property protection to your business?
34. Do you utilise third party software in your operations? If yes, which software and why?
35. What contribution, if any, does mobile tech innovation have to the society in Kenya?
36. What is missing/lacking in the mobile tech space to ensure growth?

Recognizing Africa's role in the global knowledge economy.

https://openair.africa

Open African Innovation Research (Open AIR) is a unique collaborative network of researchers investigating how intellectual property (IP) systems can be harnessed in open, participatory ways that have the potential to maximise knowledge access, innovation, and the sharing of benefits from innovation inclusively.

For more information about Open AIR, please visit our website, https://openair.africa, or contact one of our programme managers:
ottawa@openair.africa
capetown@openair.africa

Open AIR is carried out with financial support from the International Development Research Centre, Canada, the Social Sciences and Humanities Research Council of Canada, and Queen Elizabeth Scholars Program. More information about Open AIR's current and previous supporters can be found at https://openair.africa/supporters. The views expressed herein do not necessarily represent those of Open AIR's funders.