

# Ghanaian Entrepreneurship and Innovation

by

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Submitted to the Department of Mechanical Engineering  
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## Abstract

This study explores local innovation and entrepreneurship in Ghana. It presents the results of 28 in-person interviews with Ghanaian entrepreneurs who live and work in four cities across Ghana. The interviews detailed the entrepreneurs' business endeavors, backgrounds, and thoughts regarding Ghanaian innovation and entrepreneurship. The interview data was supplemented with a statistical analysis in order to observe trends among the entrepreneurs, and the main findings offer some insight into Ghanaian entrepreneurship. Overall, the interview participants found it relatively easy to start businesses in Ghana, and started businesses for a variety of reasons, which included a deficit of currently existing jobs and the desire to solve a local problem in an entrepreneurial way. In addition, the makeup of the businesses varied, and many included both a for-profit and philanthropic arms. The philanthropic arms of businesses also varied in terms of focus and informativeness. Although the cities in which the entrepreneurs are situated are very different, geography did not seem to impact the businesses' focus overall. The study also investigated the relationship of entrepreneurship to innovation in Ghana. Overall, we determined that entrepreneurship in Ghana does not always mean that innovation is occurring, and that many entrepreneurs seemed limited in their capacity to innovate. The study identifies several barriers to innovation in Ghana, including a lack of capital, infrastructure challenges, and an entrenched system of apprenticeship. Within the bounds of the study, the more innovative businesses tended to be headed by entrepreneurs who were more highly educated, and businesses with more innovative philanthropic arms tended to be started by entrepreneurs with more clearly-defined role models. The results of this study are limited because the interview participants were not selected rigorously. The findings are intended to be used as guidelines for future work relating to entrepreneurship and innovation in Ghana, and potentially other developing countries.

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# Chapter 1

## Introduction

This thesis presents the results of exploratory research conducted to understand local innovation and entrepreneurship in Ghana. Over the course of three and a half weeks, over twenty-five Ghanaian entrepreneurs were interviewed and asked about their personal backgrounds, business ventures, and thoughts relating to entrepreneurship and innovation in Ghana. This paper presents the compiled results of those interviews and draws attention to some preliminary findings based on the study sample.

The motivation for the research centers around the question of how to encourage local innovation and entrepreneurship in developing countries, such as Ghana. The research was funded by the International Development Innovation Network (IDIN), which is explained in more detail later in this section. In order for programs like IDIN to successfully support Ghanaian innovators and entrepreneurs, there must be a good foundational understanding of who is starting businesses in Ghana, what those businesses look like, and what challenges they face. Specific areas of focus for the research include the following questions:

- How does innovation relate to the innovator's education?
- How does innovation relate to entrepreneurship?
- How does entrepreneurship relate to the entrepreneur's employment history?
- Are entrepreneurs supported by their friends and family? Does Ghanaian culture encourage entrepreneurship?

All of the interviews were guided by an interview protocol developed by the re-

searchers, but the study participants were encouraged to discuss in depth any story they felt was relevant. In this way, study participants guided and shaped the direction of the research, and provided a wealth of information and insights into the experience of someone looking to start a business or innovate in Ghana.

The goal of this research is to ultimately help the development community, including IDIN and USAID, better understand Ghanaian entrepreneurship and innovation. Ideally, the results of this study will provide details about what successful entrepreneurs look like in Ghana, and what resources would be helpful for Ghanaian entrepreneurs but are not currently available. In addition, this research will hopefully be useful for guiding future research studies regarding local innovation and entrepreneurship, both in Ghana and elsewhere.

The rest of this chapter provides a summary of IDIN's activities, and an overview of the research conducted in this study. Chapter 2 of the paper provides a brief overview of the Ghanaian entrepreneurial context, and Chapter 3 describes the research methods in more detail. The research findings are presented in Chapter 4, and Chapter 5 gives recommendations for entrepreneurs in Ghana. The overall research summary and conclusions are in Chapter 6.

## **1.1 IDIN Overview**

Our travel to Ghana was made possible by the IDIN Summer Fellowship program, for which we were both selected in 2015. The International Development Innovation Network (IDIN) began in 2012 as a part of the USAID Higher Education Solutions Network (HESN), an initiative where USAID partnered with MIT and six additional universities to start programs related to global development. IDIN's work is multi-faceted, but much of it centers around workshops that are called International Development Design Summits (IDDS). Since 2007, there have been 14 IDDS summits held in various locations around the world. IDDS participants are diverse, including teachers, students, engineers, and innovators from around the world; participants apply and are selected to attend the summits, which last several weeks. At IDDS,

participants face design challenges and work to develop low-cost, appropriate technologies aimed at solving problems faced by poor communities. IDIN focuses on working with and serving IDDS alumni, who makeup the IDIN Network. In addition to facilitating IDDS summits, IDIN also provides various resources to IDIN Network members, such as funding and training, and is working to set up innovation centers to help IDIN Network members have the space and resources to innovate. Finally, IDIN is actively engaged in research to understand local innovation and how international development professionals can best engage and support local innovators.<sup>1</sup>

IDIN is actively engaged in the process of supporting local innovation, which means that they are uniquely poised to provide certain resources and trainings to local innovators, many of whom are also concerned with starting a business based on their innovation. The research conducted for this study is part of a larger, global investigation into local innovation, which will incorporate these interviews as well as IDIN Summer Fellow data, and other researchers' data, from over five other countries. This research is lead by IDIN's Research Coordinator, Elizabeth Hoffecker Moreno.

At MIT, IDIN is partnering with D-Lab, a multi-disciplinary program encompassing projects, courses, research, and more focused on “development through discovery, design and dissemination.” In many ways, D-Lab operates at the intersection of engineering and the social sciences, because of the way its classes emphasize the context into which certain engineering products will eventually be situated. According to their website, “D-Lab challenges and inspires new generations of talented students to use their math, science, engineering, social science and business skills to tackle global poverty issues.” This research project is also situated at the intersection of mechanical engineering and the social sciences, and is aimed at translating the innovation and entrepreneurship skills touted by the Mechanical Engineering Department, among others, at MIT into the very different context of entrepreneurs in Ghana.

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<sup>1</sup>More detailed information about IDIN, its programs and research projects, can be found on the IDIN website, [www.idin.org](http://www.idin.org).

## 1.2 Research Overview

This study included 28 interviews with individuals working in four cities and several rural areas. For the most part, interview participants were located before the study began, through connections and a word-of-mouth selection process. Details of the research are presented more thoroughly in Section 4, Research Methods.

For the purposes of this study, local innovation was defined using IDIN's definition, which is as follows:

Local innovation refers to processes and products that are created and used by local people to address challenges and opportunities present in their local context in ways that are novel and more effective than the prevailing practices within that context.[3]

We chose to focus on the intersection of innovation and entrepreneurship, and our goal was to interview individuals who had started an innovative business. In actuality, the study included a wide variety of individuals and businesses, some more innovative than others. This was taken into account during the analysis phase, and some of the more statistical correlations relied on a ranking of the subjective innovativeness of each interviewee.



# Chapter 2

## Background

Ghana is a sub-Saharan African nation located on the Gulf of Guinea, famous for the remnants of British colonization left behind. Ghana has a population of 25.9 million[11], and the largest city is the capital city of Accra, with a population of 1.659 million[9], where Ghana’s government administration and central business district are located. Ghana is also split up into 10 regions, similar to states, with capital cities for each. The 10 regions are the Greater Accra Region, Central Region, Eastern Region, Western Region, Ashanti Region, northern Region, Upper East Region, Upper West, Volta Region, and Brong Ahafo Region. The map found in Figure 2-1 shows Ghana geographically broken down by region. The total area of Ghana is 92,100 square miles[8], approximately the same as New York State.



Figure 2-1: Map of Ghana showing Regions [5]

For this study, the participants are located in Accra; the capital of the Ashanti

region, Kumasi, a small city in the northern Ashanti region, Ejura; and the capital of the Northern Region, Tamale. These four cities are highlighted on Figure 2-2.

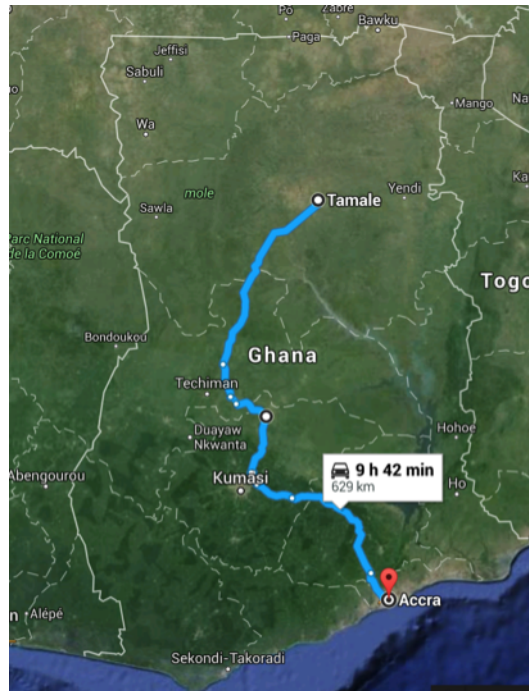


Figure 2-2: Map of cities visited in Ghana: Accra, Kumasi, Ejura, and Tamale [2]

Ghana’s national language is English, but there are over 80 different tribal languages spoken throughout the country. Most commonly spoken in the southern regions of Ghana is Tui, while Dagbani is most commonly spoken in the North. The language barriers between northern and southern Ghana make for a very interesting political situation where many Ghanaians may not be able to speak the language of their president. This language barrier also translates to businesses. If one is trying to grow a national business in Ghana, there should be great consideration given to the accessibility of information in the languages most commonly spoken.

Ghana became an independent nation on March 6, 1957 when Britain relinquished its claim in the Gold Coast, and was led to a republic state by Kwame Nkrumah, who became the president for life. Upon gaining independence, Ghana has a relatively stable political situation, and has become a success story for the African Development Bank, and raised its income level from a low income country to a lower middle income country according to the World Bank in 2010 [11]. The GDP per capita of Ghana

is 1,860 USD and has a Per Capita Income of 1,620 USD [11], which is the highest in West Africa, but overall is 21st on the continent. Ghana has plans to continue to address challenges facing the country, including infrastructure, human capital development, management of the natural resources, and corruption, to grow from a lower middle income country towards greater income equality for all.

Comparatively to other West African nations, Ghana's accelerated economic growth has helped the country achieve the millennium development goals. The 2015 summary of Ghana's MDG Progress that of the 8 development goals (using 17 different targets and 36 indicators for Ghana specifically), Ghana achieved 4, and made significant progress towards 2 more. Ghana claims to have largely achieved Eradicating extreme poverty and hunger, to have achieved universal primary education, reduced child mortality, and developed a global partnership for development. Ghana has also made significant progress towards combating HIV/AIDS, malaria, and other diseases, and promoting gender equality and empowering women [12].

However, lately there has been economic stagnation in Ghana, resulting in borrowing funds from the International Monetary Fund, and has "undermined its reputation abroad for financial management" [14]. The most notable change to most Ghanaian citizens is the energy crisis which results in frequent blackouts across Accra. Additionally, the depreciation in the Ghanaian Cedi, or the currency of Ghana, has created a lack of confidence in the economic stability of Ghana. Some believe that Ghana still has obstacles, including infrastructure and human capital, to overcome before it can continue to grow economically again.

Overall, Ghana's favorable political conditions has allowed for progress compared to other West African nations. Although Ghana is still developing, and has challenges ahead, the nation has a growing entrepreneurial movement.

## **2.1 Doing Business in Ghana**

Within the improving economic conditions of Ghana, starting a business involves 8 distinctive steps in order to create a legal and operational business. The 8 steps are

shown in Table 2.1. Although each step seems relatively easy to achieve, it is interesting to note that access to the appropriate offices and departments to incorporate in Ghana is not easy for all citizens. For instance, it may require days of travel to visit the Registrar-General Department, and the proper authentication forms. Table 2.1 is based off the Ease of Doing Business report from the World Bank Group, where they studied only Accra, the capital city of Ghana [21]. This procedure also does not include registering property as a business headquarters, or setting up electricity for the business. Instead, this is just the steps it takes to incorporate in Ghana.

Table 2.1: Steps to Starting a Business in Ghana [21]

Step	Procedure	Time to Complete	Cost to Complete
1	Acquire a Tax Identification Number	2 days	No Charge
2	Check for availability of company name and submit company documents to obtain the certificate of incorporation	1 day	Approximately GHC 300
3	A Commissioner of Oaths authenticates forms required for the certificate to commence business	1 day (simultaneous with previous procedure)	GHC 5-10
4	Obtain from the Registrar-General Department the certificate	2 days (simultaneous with previous procedure)	0.5 percent of the stated capital as commencement tax + GHC 10
5	Deposit paid-in capital in an account	1 day	No Charge
6	Apply for business licenses at the Metropolitan Authority	7 days	GHC 270
7	Inspection of work premises by the Metropolitan Authority	1 day (simultaneous with previous procedure)	No Charge
8	Apply for Social Security	1 day	No Charge

### 2.1.1 Infrastructure Challenges to Businesses In Ghana

[b]

Starting a business in Ghana is just the first challenge for entrepreneurs. Infrastructure challenges, including lack of electricity and lack of regular computer access can make creating a business even more challenging.

Vital for all businesses is access to electricity. In Ghana, part of the process of setting up a business is purchasing electricity. However, this barrier to entry is extraordinary for the average Ghanaian. The cost alone of obtaining a new electricity connection is more than 15 times yearly per capita income. The procedure alone requires approximately 79 days. The four steps to follow can be found in Table 2.2. Additionally, the price of electricity in Ghana (measured in US cents per kilowatt hour) is 25 in Accra [21].

Table 2.2: Procedure for Getting Electricity in Ghana [21]

Step	Procedure	Time to Complete	Cost to Complete
1	Hire Registered Electrical Contractor	2 days	GHC 400
2	Submit application to Electricity Company of Ghana (ECG) and await estimate	14 days	GHC 5
3	Receive site inspection and internal wiring inspection by ECG and await estimate	10 days	No Charge
4	Receive external works, meter installation and electricity flow	53 days	GHC 62,209.41

The expense alone of getting electricity will provide a barrier to entry of those who do not have access to the grid. However, Ghana’s capital city of Accra also struggles from power outages on a regular basis, which can halt productivity of a business.

Blackouts in Ghana have occurred on a regular basis since the country started exporting oil. Power from Ghana is generated in two ways, through hydro-generation and thermal generation, both of which have been declining in productivity. Due to the climate change, and the changes in the rainfall patterns, there is less water flowing into the Volta River, and therefore less energy produced by the Akosombo Dam. Additionally, the insufficient supply of gas has led to cutbacks in thermal generation as well. As a result, many of the cities in Accra have been put on a power rationing

schedule of 12 hours of light followed by 24 hours of darkness. However, the lights are not consistent for 12 hours.

To cope with this infrastructure challenge, many have opted to purchase diesel generators to provide electricity. However, many Ghanaians cannot afford these, keeping many in darkness. Additionally, the government has levied higher tariffs on petroleum, increasing the rates of the tariff over four times in the past year [19]. Diesel is 20 percent or 30 percent more expensive than other fuels, and pollutes greatly. Other problems with this solution is the services dependent on electricity. For example, hospitals that rely on electricity to function properly, cannot afford the electricity to do so, and therefore cannot offer appropriate care.

The outdated power sector of Ghana as a whole is attempting to be reformed. With the help and investment of GE, there are new power plants being constructed in Ghana, and the government is taking steps to mitigate the energy crisis for citizens. Although the government is trying to bring about change, it is important to note the climate in which entrepreneurs are entering the business market - without consistent electricity in many cases, or with the burden of diesel pricing if power is necessary.

Another infrastructure problem for entrepreneurs, closely related to power, is the lack of Internet access nationwide. The World Bank states that 18.9 percent of the population of Ghana has Internet access, which is defined as individuals who have used the Internet (from any location) in 12 months. Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV, etc. [11]. Although Ghana's population shows a positive trend for increased Internet access, it is important to note that this means four in five Ghanaians do not use the Internet, and have not in the past 12 months. Therefore, Ghanaians without Internet cannot learn from all the information available and the connectivity of the world through the Internet. In fact, these Ghanaians cannot utilize the resource of the Internet at all. In more developed nations, the Internet can serve as a resource to answer questions, to understand processes.

When approaching entrepreneurship in Ghana, it is critical to understand the resource constrained environment, and what challenges each entrepreneur faces. Al-

though all entrepreneurs have different struggles, and encounter different challenges, the nationwide challenges are similar.

## **2.2 Education**

In order to better understand Ghana's innovation climate, it is paramount to understand the education system in Ghana. The literacy in Ghana, taken from UNICEF, is 71.8 percent of the population [10]. However, the literacy also varies significantly based upon the region. For example, the Greater Accra Region and Ashanti region have the majority of the population as literate, while other regions, including the Upper East and Upper West Regions have less than one fourth of the population as literate. Therefore, the climate for entrepreneurship is drastically different between cities like Accra and Kumasi, and those in the northern regions. The needs of the population are different.

Education also varies across regions, and notably between urban and rural areas. A marker for level of school achieved in Ghana is known as the Middle School Leaving Certificate/ Basic Education Certificate, or the MSLC/BECE. Nearly one half of Ghanaians have achieved this level of education, but only 16.6 percent of males and 10.7 percent of females have completed Secondary School or higher [18]. In rural populations, one third of Ghanaians have never been to school, and an additional 40 percent have not achieved their MSLC/BECE, while in urban populations, only 17.9 percent of people have never been to any formal school [18].

### **2.2.1 Apprenticeship**

Ghanaians have alternative ways to learn skills, and earn wages. A non-insignificant portion of the population enters into an apprenticeship working situation. Apprenticeships are ways for children to learn a trade, and therefore sell goods and services learned without formal schooling. Many Ghanaians are employed by the informal job sector, and the apprenticeship system in Ghana is a large sector of the informal job sector, especially for teenagers.

In this study, apprenticeship is seen in interviews with entrepreneurs in Suame Magazine. Suame Magazine, an association of builders, repairmen, and most importantly car services individuals in Kumasi relies on the apprenticeship system to keep up with demand of services without having to pay for labor. Suame Magazine has become the heart of manufacturing in Ghana, and the apprenticeship system thriving there offers a way for people to get a job, and learn a skill. Suame Magazine is filled with apprentices learning metalworking, casting, welding, and other trades from their masters, and learning how to build and repair machinery in a hands-on setting.

The apprenticeship system poses many challenges to a successful entrepreneur. Although apprentices are incredibly valuable as free or underpaid laborers for the business owner, the business owner is then passing along all his knowledge and business practices to his apprentice. Then, after a certain amount of time of learning from a master, the apprentice can go off and start his or her own business, and take a part of the master’s market share. Although this leaves the master without a skilled worker and with a new competitor in the market, he has benefited for years with additional hands requiring less pay than hiring other masters. Therefore, the system has continued on. Table 2.3 shows the different trades learned in apprentice settings, and the different average lengths of apprenticeships varying by trade.

Table 2.3: Average Lengths of Apprenticeship by Trade and Geographical Location in Months [18]

Main trade learnt	Urban			Rural			Ghana		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Food preparation processing and beverage services	30.0	32.0	31.8	32.2	31.9	31.9	31.1	32.0	31.9
Health service and related activities	40.5	40.2	40.4	36.0	34.0	34.8	38.6	36.8	37.6
Personal/grounds service	35.5	34.6	34.7	31.8	34.6	34.5	34.0	34.6	34.6
Building	36.5	36.0	36.5	36.1	36.8	36.1	36.3	36.6	36.3
Automotive	38.2	39.0	38.3	35.3	42.0	35.4	36.9	40.0	36.9
Electrical	38.9	36.0	38.8	37.1	0.0	37.1	38.2	36.0	38.2
Mechanical	37.9	40.0	38.0	37.8	36.0	37.7	37.9	38.4	37.9
Fishing/Hunting/Forestry	26.2	32.0	27.3	35.5	33.2	34.3	32.1	33.1	32.6
Textile, Apparel and Furnishing	35.8	34.9	35.1	34.4	34.5	34.5	35.1	34.7	34.8
Other production related trades	35.4	25.2	29.2	27.8	24.2	25.3	31.1	24.6	26.8
Transportation and material moving trades	33.1	44.0	33.1	33.0	32.8	33.0	33.0	34.4	33.0
Visual and Performance Artists	31.3	0.0	31.3	33.9	0.0	33.9	32.2	0.0	32.2
Administrative/Support Services	0.0	36.0	36.0	36.0	0.0	36.0	36.0	36.0	36.0
Others	33.0	40.5	34.0	31.7	30.3	31.5	32.3	34.0	32.6
Total	36.1	34.5	35.3	35.0	34.0	34.6	35.6	34.3	35.0



Apprentices are often a source of underemployment in Ghana, especially when apprenticeships continue through working age (15 years) for Ghanaians. The apprentices are of working age, but are not earning the income they could be in other trades, and although they are counted as part of the employed population of Ghana, they are not creating the wealth they could be in other positions. However, apprenticeships are hands on education for those who will continue this trade all their lives, and earn a suitable Ghanaian income as a result of becoming skilled laborers. Many who do not continue through higher education find apprenticeships to be a good alternative for they have a valuable skill.

Interestingly enough, there is speculation as to whether these skilled laborers of Suame Magazine, which is incredibly focused on automotive vehicles, will be able to thrive as cars become more electrical in nature, especially as the trades have been passed along from mechanical expert to apprentice through teaching. The educational system of apprenticeships in Suame Magazine will have to grow to have the capacity of learning electro-mechanical systems as these are more integrated into modern-day machinery.

### **2.2.2 Higher Education**

A small fraction of Ghanaians find themselves attending university and pursuing higher education. Many of the entrepreneurs participating in this study are graduates of Ghanaian colleges. Public universities enroll the largest number of students in Ghana. In 2012/2013, 45.3 percent of the 283,506 students in Ghana attending college chose to enroll in public colleges [17]. Private institutions take 19.5 percent of students, and polytechnics enroll 18.7 percent [17].

There is, in many cases, an order of magnitude difference in the price of public universities versus private universities. The cost of higher education for six public and six private universities in the Greater Accra Region and the Ashanti Region is shown in Table 2.4.

There are many critiques of the educational system in Ghana. Two Ghanaian authors published a case study examining a two-year college degree, like the Asso-

Table 2.4: Price Comparison between Public and Private Universities in Ghana [13]

Ghana's universities	Private expenditure per student in higher education (excludes room and board)
<p style="text-align: center;"><u>Public</u></p> <p><b>1. University of Ghana, Greater Accra region (GAR)</b>  <b>2. KNUST– Ashanti region (AR)</b>  <b>3. Cape Coast University –Central region</b>  <b>4. University of Development Studies – Northern region</b>  <b>5. University of Education, Winneba –Central region</b>  <b>6. Ghana Institute of Management &amp; Public Administration – (GAR)</b></p>	<p style="text-align: center;"><b>GHC350 per year</b></p> <p style="text-align: center;"><b>GHC400 per year</b></p> <p style="text-align: center;"><b>GHC407 per year</b></p> <p style="text-align: center;"><b>GHC418 per year</b></p> <p style="text-align: center;"><b>GHC290 per year</b></p> <p style="text-align: center;"><b>\$2,000 per year</b></p>
<p style="text-align: center;"><u>Private</u></p> <p><b>1. Central University College–(GAR)</b>  <b>2. Pentecost University College–(GAR)</b>  <b>3. Garden City University College–(AR)</b>  <b>4. Asheshi University – (GAR)</b>  <b>5. Christian Service University College–(AR)</b>  <b>6. Regent University of Science &amp; Technology –(GAR)</b></p>	<p style="text-align: center;"><b>GHC2,600 per year</b></p> <p style="text-align: center;"><b>GHC2,120 per year</b></p> <p style="text-align: center;"><b>GHC1,500 per year</b>  <b>\$5,590 per year</b></p> <p style="text-align: center;"><b>GHC1,600 per year</b></p> <p style="text-align: center;"><b>GHC 2,710 per year</b></p>

US\$1 = GHc1.44

ciate’s Degree in the United States Educational System. In their paper, Appiah and Ebenezer discussed the main problems with public universities [13]. Unfortunately, because of the tuition cost, especially compared to private universities, many students seeking higher education will enroll. However, because of the lack of checks and balances on the efficiency of the government funds in public universities, and the lack of accountability of the university, these funds are misused. In many public universities, the student to lecturer ratio is 1000 to 1 [13]. Moreover, lecturers are not paid sufficiently, and often take other jobs to make ends meet. Additionally, there are not enough spots available in public universities to fit the amount of qualified students now graduating from secondary school in Ghana. In fact, there is a large disparity between the percentage qualified to attend a public university in Ghana and those actually admitted. Due to space restrictions at the public universities (which in some cases, like the University of Ghana at Legon already enrolls approximately

40,000 students), universities have been using tougher screening methods for admitted students, including the Advanced level General Education Examination and the Senior Secondary School examination [15]. In order to better envision the disparity between the amount of qualified students and spots available in public universities, Figure 2-3 demonstrates the difference between the percentage of students qualified to attend University of Ghana at Legon and the percentage actually admitted.

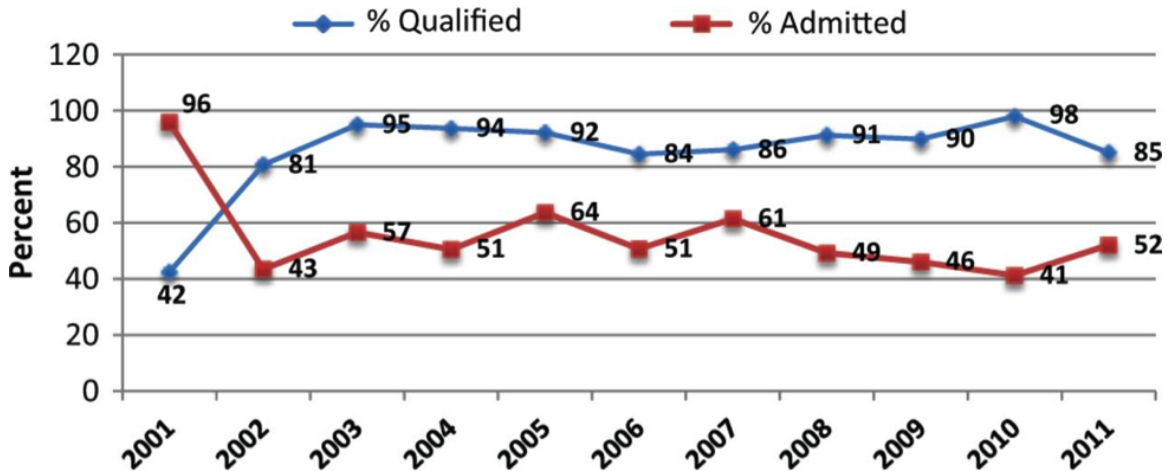


Figure 2-3: Percentage of Qualified and Admitted Students to University of Ghana at Legon [15]

However, as Ghana progresses, the job market demands college education. This has led to the establishment private universities in Ghana, with the first university starting in 2000. Therefore, Ghanaians who are financially capable to pay the more expensive tuition have the opportunity to enroll in private universities. Most of the new private universities offer bachelors' and masters' degree programs in the Arts and Sciences.

In order to see a breakdown of the subjects of study for Ghanaian University Students, Figure 2-4 shows the enrollment trend for academic programs by gender.

It is also interesting to note the disparity between the enrollment in undergraduate students on a regional level. While looking at the breakdown of the University of Ghana undergraduate students by the region in which they originate from, most students hail from the Volta Region, Ashanti Region, or Eastern region. Very few come from the Northern Region Upper East, Upper West or Western. Figure 2-5

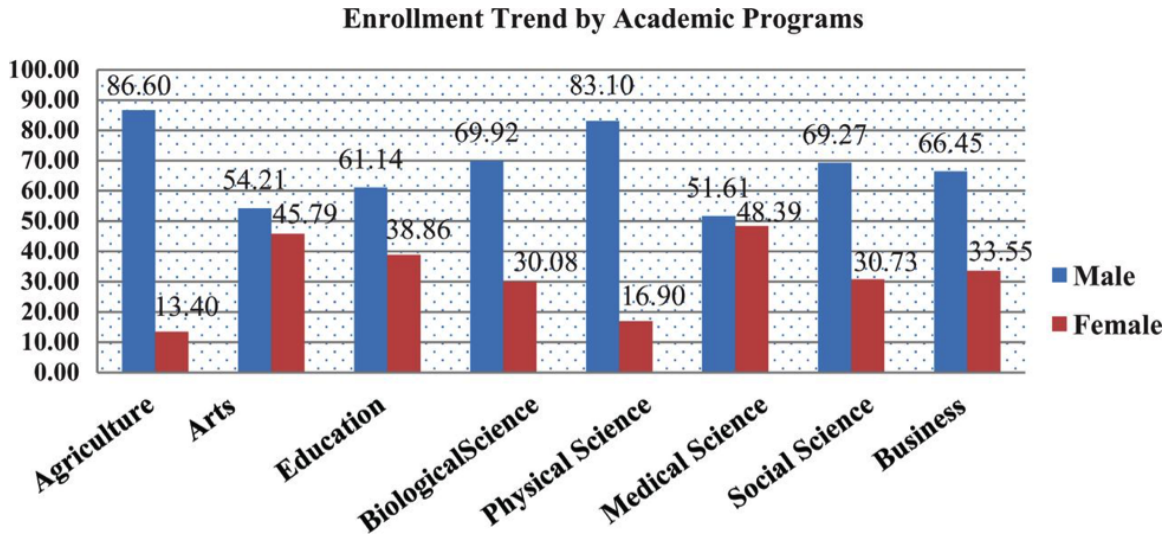


Figure 2-4: The enrollment trend by Academic Program aggregated over all Ghanaian Universities [15]

shows the breakdown as a percentage of the total number of undergraduate students in 2011 enrolled at the University of Ghana at Legon. It is interesting to note that the University of Ghana is located in the Greater Accra Region. The 5 regions where most students originate are more economically viable, and therefore the students can afford the school fees. Therefore, students who are from “well-resourced [regions] have a better chance of accessing higher education than their counterparts from historically disadvantaged regions” [15].

Higher education in Ghana is increasing in popularity as more individuals require a college education to achieve financial success. However, higher education in Ghana is much more accessible by those of a stable socio-economic background.

### 2.2.3 National Service Scheme

Following graduation from a secondary or tertiary educational institution, all Ghanaians participate in National Service, or one year of service to a government institution in one of a variety of different areas before starting a profession. Approximately 64,000 Ghanaians are placed annually in areas including “Educational Support, Agribusiness, Urban Traffic Management, Urban Sanitation Management, Community Health, Rural Development, Private Sector Support, and General Administration in the various

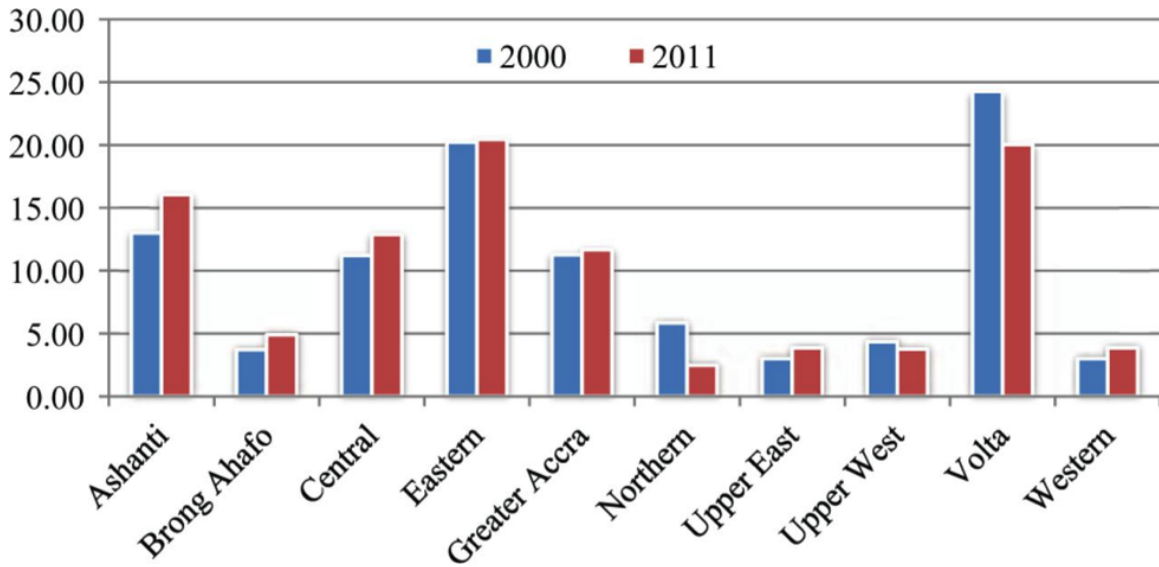


Figure 2-5: Region of Origin of undergraduate students at University of Ghana in 2011 [15]

Metropolitan, Municipal, and District Assemblies, and other User Agencies in Ghana” [1].

The National Service Scheme started as the Builder’s Brigade, which started as a volunteer system to counter unemployment by providing a civic service program that aided the overall development of the country for any Ghanaian under 45 years old. However, the Builder’s Brigade had many discipline problems, including public intoxication and absenteeism. President Nkrumah worked to improve the Brigade’s public image alongside those involved with the Israeli Youth Movement, and moved towards school children for the lessons in patriotism that the Brigade was created to provide [16].

After years of reform, the National Service Scheme was born, which is a mandatory version of the youth-targeted initiative “to address the technological, education and agricultural needs of the country” [16], especially in the most underdeveloped parts of the nation.

Postings for the National Service Scheme become available for the participants in September, directly before they begin their year of national service. When placing students, the National Service Scheme takes into account the location preferences of the student, as well as the sector preferences, and attempts to match graduates

accordingly. Moreover, there are monthly and end-of-service assessments where the graduates can provide feedback to their supervisors and on the work they are specifically participating in.

The government does provide monthly stipends for the National Service participants. Unfortunately, due to the recent inflation of the Ghanaian cedi, the monthly stipend of GHC 350 is not enough to make ends meet for the graduates. However, the government does not have the budget to increase the monthly stipend for all 64,000 participants. After Ghanaians participate in this program for one year, they begin their careers working in either the public sector, the private sector, or the informal sector.

## 2.3 Workforce

The Ghanaian workforce is made up primarily of the informal private sector. The public sector of Ghana makes up for approximately 6 percent of the total workforce, the private sector makes up approximately 8 percent of the total workforce, and the informal private sector makes up for about 86 percent [20].

There are approximately 250,000 Ghanaians who enter the workforce annually. This number represents those who have completed national service after completing their education and those who have reached a working age and have decided to begin working instead of continuing with their education. Of that 250,000 people, approximately 5,000 will find jobs within the formal labor market, and therefore 98 percent will find employment within the informal sector [18].

Interestingly, according to the Ghana Statistical Service, or GSS, more than half of Ghanaians identify as self-employed (55 percent) [18]. However, most of these Ghanaians are operating out of the formal labor market, and therefore are not counted as part of the formal labor market. There is also a sector of the Ghanaian labor market known as the contributing family workers, who are working in family based enterprises, or are working as apprentices, which encompasses approximately one-fifth of the labor market. In order to see the breakdown of employment by gender and geo-

graphic setting, Table 5 shows both the traditionally employed and the contributing family member breakdown. It is worth noting that the GSS defines employed as all persons who did some work for pay, profit, or family gain during the reference period of the survey regardless of the hours they worked (2008 for this study). Therefore, it is important to note that underemployment is not considered by the GSS, and therefore the 9.15 million individuals who make up the workforce according to the GSS may not all be satisfied with the hours they have worked or wages they have earned [18]. This is not considered by this study, and therefore those who are underemployed are counted as employed.

Table 2.5: Employment Status of the Working Age Population by Sex and Locality (Percent) [18]

Employment Status	Urban			Rural			Ghana		
	Male	Female	All	Male	Female	All	Male	Female	All
Employee	49.7	20.1	34.8	13.8	2.8	8.0	27.0	8.9	17.6
Employer	7.4	5.5	6.4	4.2	2.7	3.5	5.4	3.7	4.5
Self-employed	33.8	60.3	47.2	64.3	55.0	59.4	53.1	56.9	55.0
Contributing									
Family worker	4.1	11.0	7.6	16.2	37.9	27.5	11.7	28.5	20.4
Apprentice	4.7	3.0	3.8	1.5	1.5	1.5	2.7	2.0	2.3
Other	0.3	0.1	0.2	0.1	0.0	0.0	0.2	0.1	0.1
Total	100	100	100	100	100	100	100	100	100

Source: GSS 2008

From Table 2.5 it is interesting to note that it is more common to be self-employed in urban areas. Much of the formal private sector and the public sector takes place in urban areas, and therefore there are fewer formal opportunities available for Ghanaians located in rural towns.

To better picture the workforce of Ghana, Table 2.6 shows the breakdown of employment by sector or industry. Agriculture is by far the largest employment sector, and most of the agricultural employment is informal in nature.

Agricultural employment makes up approximately three-quarters (75.3 percent) of

Table 2.6: Industrial Distribution of the Employed by Sex (percent) [18]

Industry	Ghana		
	Male	Female	All
Agriculture	59.1	52.7	55.8
Fishing	2.3	0.5	1.4
Mining	1.1	0.3	0.7
Manufacturing	8.5	13.3	10.9
Electricity	0.3	0.1	0.2
Construction	3.5	0.1	1.8
Trade	8.4	21.6	15.2
Hotel & restaurants	0.6	3.1	1.9
Transport & communication	5.2	0.5	2.8
Financial services	0.5	0.1	0.3
Real estates	1.4	0.3	0.8
Public administration	2.1	0.6	1.4
Education	3.6	2.3	2.9
Health and social work	0.8	0.8	0.8
Other community services	2.0	3.4	2.7
Activities of private households	0.4	0.3	0.3
Extra territorial organizations	0.1	0.0	0.0
<b>All</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: GSS 2008

the workforce in rural areas [18]. The other largest sector of Ghanaian employment is the trade and manufacturing sectors. Combined, these three sectors make up approximately 82 percent of the workforce of Ghana [18].

It is important to note the unemployment in Ghana, and especially as it pertains to age. Table 7 shows the breakdown of unemployment by Gender and Age in Ghana. Unemployment is defined by the GSS to include “all persons who did not work but were actively seeking work or were at least available to take up work if they were offered one during the reference period of the survey” [18].

Interestingly, although not shown by this table, the GSS reports that unemployment is higher in urban areas, especially in Accra where unemployment is 8.9 percent. In urban areas, unemployment among males (6.7 percent) is slightly higher than fe-



Table 2.7: Unemployment by Age in Ghana (percent) [18]

Age	Sex	
	Male	Female
15-24	4.1	4.1
25-44	4.0	4.0
45-64	1.8	2.0
All	3.5	3.6

Source: GSS, 2008

males (6.2 percent). However, in rural areas, females have a higher unemployment rate (1.7 percent) than males (1.4 percent). Unemployment is also disproportionately higher for youth [18].

Finally, the employment market emulates the current productive sectors of Ghana: agriculture, industry, and service. However, the public sector has dwindled due to policies of retrenchment and redeployment, according to the World Bank. The formal private sector has also contracted. The current informal sector serves as the bulk of employment of Ghanaians, and this is a major developmental challenge to the nation [22].



# Chapter 3

## Research Methods

The research for this study consisted of 28 interviews conducted in Ghana in August and early September of 2015. The researchers visited 4 cities (Accra, Kumasi, Ejura, and Tamale) as well as a few more rural villages to speak with local entrepreneurs about their backgrounds and business ventures.

### 3.1 Interview Selection

Interview participants were identified by word-of-mouth through inquiries sent before traveling to Ghana. The message sent to locate interview participants looked like the following: My research is going to be conducted between August 17 and September 10, and regards local innovation. More specifically, my research partner and I are actively looking for Ghanaians in Accra, Kumasi, and/or Tamale who have created a new technology or idea for their communities, and we are very interested in those who have created a business off of their technology or idea, and are sustaining life in Ghana off of their entrepreneurship.

As we had never traveled to Ghana prior to this study, we did not have experience locating or interviewing Ghanaian entrepreneurs. Therefore, the interview participants were mostly located through connections; MIT D-Lab has an extensive network in Ghana, and in addition there are several Ghanaian MIT students who put us in touch with people to interview.

It should be noted that locating interview participants in this way introduced a certain selection bias into the research. By locating participants through word-of-mouth, most of the entrepreneurs interviewed were already fairly successful. By only interviewing entrepreneurs who are also seen as innovative, there is no comparison to non-innovative entrepreneurs that would allow definitive conclusions regarding what makes someone more or less innovative. In future work, it would be important for this type of research to include interviews with entrepreneurs who are not innovative, as a point of comparison.

The interview selection process for this research also fell short when it came to diversity of the study participants. Very few female entrepreneurs were interviewed relative to male entrepreneurs, and almost the entirety of the sample was college educated. There are no reliable statistics on the number of current entrepreneurs or how this sample relates to the overall pool, so it is difficult to know how representative the sample of interviewed entrepreneurs reflects all of Ghanaian entrepreneurship. For future studies, it would be beneficial to the researchers to focus on gender equality among the interview participants, and to diversify the sample in terms of education level. In addition, most of the entrepreneurs interviewed here knew each other, limiting the scope of the sample to only certain networks (for example, most college-educated entrepreneurs in Accra know each other and overlap).

## **3.2 Interview Data Overview**

Of the 28 total interviews conducted, eight were conducted in the greater Accra area. The interviews with the founders of Asoriba and Flippy Campus were conducted at the Meltwater Entrepreneurial School of Technology (MEST), which is an incubator and training program for young entrepreneurs in Ghana founded in 2008. The competitive program provides a year of training and mentoring in computer science and entrepreneurial skills; at the end of the year, some students are selected to continue in the MEST incubator program, which offers seed round investment and continued mentoring opportunities. MEST is funded by the Meltwater Group.[6] The other

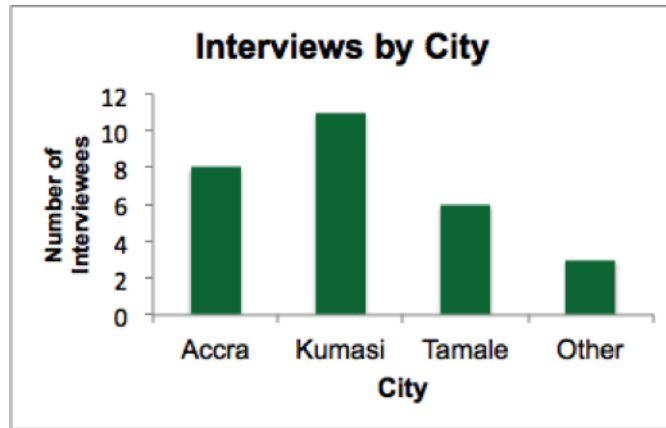


Figure 3-1: Breakdown of interviews by city.

interviews in Accra were unaffiliated with MEST or start-up accelerators. The entrepreneurial scene in Accra is rapidly modernizing, and start-up accelerators are becoming more popular, and well-known. We learned of at least three such incubators currently located in Accra, although MEST was the only one to offer such intensive education programs for its participants.

The next 11 interviews were conducted in Kumasi, which included five in Suame Magazine. The interviews in Suame Magazine were facilitated by an employee of the Intermediate Technology Transfer Unit (ITTU), which is affiliated with KNUST. [4]

Six interviews were conducted in Tamale, the capital of the Northern Region in Ghana. The final three interviews marked “Other” in Figure XX were conducted with entrepreneurs who work outside of Accra, Kumasi, and Tamale. These included two interviews in more rural areas outside of Kumasi, and one interview with an entrepreneur who works in Takoradi, a coastal city. Figure 3-1 shows the breakdown of interview participants by location.

Table 3.1 presents an overview of the interviews conducted; it should be noted that all of the interviewees gave us permission to reprint their full names and titles in this report, and our full consent form is reprinted in Appendix C. In general, most of the businesses were small, with the exception of TechCom Visions. Most of the businesses were also relatively new. Figure 3-2 shows the breakdown of interview participants by gender.

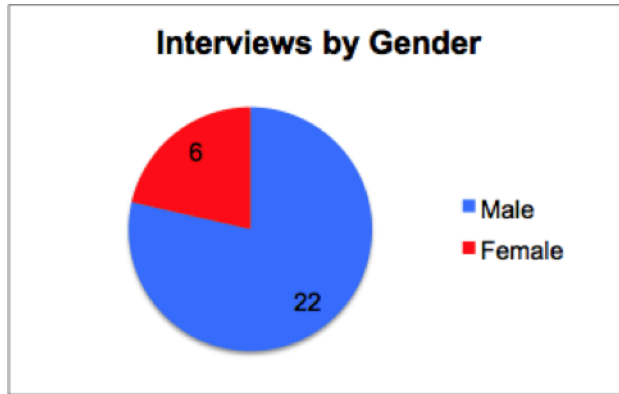


Figure 3-2: Breakdown of interview participants by gender.

Table 3.1: Overview of Interview Participants

Interviewee Name	Business Name	Business Description
Saviour Dzage	Asoriba	Online software for church management.
Jesse Johnson		
Patrick Ohe-meng		
Bright ??	Flippy Campus	Online college message board and job postings.
Tsonom Akpeloo	TechCom Visions	IT solutions company.
Samlara Baah	LooWorks	Sanitation solutions for the bottom billion.
Kwaku	BioFil Com	Alternative home sanitation systems (biogas).
Regina Agyare	Soronko Solutions	Software development company.
Alloysius Attah	Farmerline	Mobile services for farmers.
Emmanuel Ad-dai		

Continuation of Table 3.1		
Interviewee Name	Business Name	Business Description
Bernice Dapaah	Ghana Bamboo Bicycles; Bright Generation	Solves environmental problems and educates farmers about multiple uses of bamboo; Bright Generation is an NGO that focuses on sustainable rural development.
Johannes Arthur	Waste Factor	Furniture and consumer goods made from waste.
Kwaku Fosu	Miracle Metal Works	Safe manufacturing business.
Montari Seidu	Montals Engineering	Manufactures gas ovens, stoves, and other gas appliances.
David Frimpong	Frimpong Engineering	Metal company specializing in food processing machines.
Abu Adams	Metalworks Business	Metalworks business that makes donkey carts, wheelbarrows, and other sheet metal products.
Ibrahim Musah	Ibrahim's Casting	Casting shop making basic parts from aluminum, bronze, lead, and cast iron.
David Asiamah	AgroMindset	Commercial farm and agriculture education provider.
Prince Boadu	MapTech Registers	Technology solutions for businesses based on GIS marketing.
BoBoBoo	Taimako Enterprise	Medicinal healing, processing of local crops, ornamental plants and landscaping.
Fiaza	Taimako Enterprise (Rain Corp)	
Senyo Kelly?	SeKaf Ghana Ltd	Social enterprise that produces natural Shea cosmetics.

Continuation of Table 3.1		
Interviewee Name	Business Name	Business Description
Joshua Wuntimah	Poultry Farm	Tilapia and poultry farm.
Maccarthy Lomotey	Hop-In Academy	Resources and education for young entrepreneurs.
Portia Derry	Funky Read Write Clinic	Free literacy clinic for rural youth.
Ibrahim	Ibrahim's Storage Enterprise	Stores, processes, and helps sell maize for farmers.
Ebenezer	Addi Lights Africa	Custom lamps.
Kofi Boa	Centre for No-Till Agriculture	Education and demonstration farm promoting conservation agriculture.

### 3.3 Interview Method

The interviews were conducted in a semi-structured manner, following the interview protocol from Appendix A. The purpose of the interview was to understand the interviewee's innovation or business, personal background, and influences during innovating and starting his/her business. The interviewees were encouraged to tell stories about when they founded their businesses or began innovating on an existing idea, and why. The interviews lasted between 30 minutes and one hour, and were recorded with the interviewees' permission.

The full interview protocol can be seen in Appendix A. The first section of the interview focused on understanding the business and/or innovation by the interviewee. We asked questions to understand the business model and mission, and tried to gauge the size and relative position of the business in the market – for example, if the business had any direct competition, and how new or innovative the idea behind the



business was.

We then asked about the process of starting the business. This was loosely structured, because most of the interviewees had a particular “founding story” that they told us. We particularly focused on any people or organizations that were particularly helpful or supportive during the process. We then asked about the background of the individual interviewee, focusing on where he/she was raised, his/her education history, and family background. The purpose of this was to try and gauge how relatively supportive each individual’s family and relatives were towards entrepreneurship.

Finally, we asked about major challenges faced by the interviewee and any skills or training that the interviewee found particularly helpful, or that the interviewee did not have but wished he/she had participated in. We concluded the interviews by asking about the interviewee’s thoughts on entrepreneurship in Ghana – what the major challenges are, what the general attitude towards entrepreneurship is, and what could be done to support both Ghanaian entrepreneurship and innovation.

### **3.4 Correlations**

In order to quantitatively examine results and themes from the study participants, a statistical study was performed on both binary and continuous data extracted from the interviews. ANOVA, or analysis of variance, was the primary statistical study performed, which is used to analyze the differences among group means and their associated procedures.

For the purposes of this study, ANOVA was used to see the correlation between different independent variables and dependent variables to observe any patterns. It is important to note that this statistical method was not used to draw any conclusions for Ghana at large, but was to allow for observing different correlations or connections within the data. Due to the small sample size, conclusions from this statistical analysis can only aid the thematic evaluation of the sample of entrepreneurs.

The first step to the quantitative analysis was to assign variables and numerical values to each variable. The variables of interest are shown in Table 3.2, as well as

whether this variable is continuous or discrete. For the "innovativeness" variables, we came up with our own ratings that compared the entrepreneurs interviewed to each other, with the most innovative entrepreneur rated as a 5 and the least as a 1.

Table 3.2: Variables for correlations

Variable Name	Variable Type
Age	Continuous
Gender	Discrete (Male or Female)
City	Discrete (Accra, Kumasi, Tamale, Ejura, Rural)
College Education	Discrete (Yes or No)
Support System	Discrete (Yes or No)
Role Models	Discrete (Yes or No)
Innovativeness of Business	Continuous (Rated 1-5)
Business Size	Continuous (Rated 1-5)
Philanthropic Arm	Discrete (Yes or No)
Innovativeness of Philanthropic Arm	Continuous (Rated 1-5)

Variables like Gender and City were coded to give meaning to the numerical value. For example, the city codes were 0 for Accra, 1 for Kumasi, 2 for Tamale, 3 for Ejura, and 4 for a rural area. For continuous variables, the two authors ranked the subjective variables based upon the evidence from the interviews as compared to the others in the study. In order to eliminate bias by ranking the variables, the two authors ranked the subjective variables separately, and then came together to discuss results.

Twenty-eight entrepreneurs were evaluated through this correlation method. The chart showing the variables for each of the entrepreneurs in this study can be found in the Appendix. The independent variables chosen for the study are: Age, Gender, City, College Education, Support System, and Role Models. The dependent variables are Innovativeness of Business, Business Size, Philanthropic Arm, and Innovativeness of Philanthropic Arm.

The software used to perform the statistical analysis was JMP 12.0, available for

download through MIT IS and T. JMP allows a user to use the "Fix Y to X" function, which shows the analysis of variance between each of the independent and dependent variables. The correlations that were proven to be statistically significant are found in the figures attached in Appendix B. Important conclusions and trends that this method allowed the researchers to see are discussed in Chapter 4.



## Chapter 4

# Findings About Ghanaian Entrepreneurship

This section contains some preliminary conclusions about the study participants' experiences with entrepreneurship and innovation in Ghana. It should be noted that these conclusions are not generalizable beyond the scope of this study, as the study participants were not selected in a rigorous manner. Rather, this is intended as summary of the information given across the interviews in the context of Ghanaian entrepreneurship and innovation. The majority of the findings are supported by the relevant qualitative information taken from the interviews; where noted, certain findings reference correlations.

The intention of this research was to explore the connection between innovation and entrepreneurship. For the purposes of this study, we defined “local innovators” as Ghanaians who have developed a creative solution to a problem. More often than not, the local innovators with whom we spoke were entrepreneurs who had also started a business. This seemed logical, as innovating becomes more practical if it can be used to earn income.

Section 4.1 refers to what the interviews showed about starting and running a business in Ghana. Section 4.2 relates to the connection between innovation and entrepreneurship in Ghana.

## 4.1 Entrepreneurship in Ghana

### 4.1.1 Study participants found it relatively easy to start a business.

The process for starting a business differed among the study participants, depending on the individual entrepreneur and the type of business. Ebenezer, the founder of a custom lamps business, gained mechanical skills through involvement with a local Fab Lab in Takoradi. He started his business rather informally, after getting some orders for custom lamps from relatives and friends who saw what he had made. He then began selling online, and runs the business out of his house. Ebenezer seemed to be on the more informal side. Prince started a non-profit called Evolve Africa during his second year of undergraduate study. In order to start this, he traveled to Accra with his co-founder to get it registered as a non-profit.

Overall, however, none of the study participants seemed to consider the process of starting a business as particularly onerous or bureaucratic. In fact, David Asiamah described starting a business as “jumping off of a cliff,” in that even though he took entrepreneurship very seriously, he dove in quickly and learned most of his business skills on the job. Several study participants, when asked about the challenges to starting a business in Ghana, cited lack of financing as a pressing challenge. This seemed more relevant to the software and technology businesses. Lack of capital, as explored in Section 4.2.1 as a barrier to innovation, is also seen a challenge to starting a hardware or mechanical business.

When asked about his attitude towards entrepreneurship in Ghana, Tsonom, the CEO and founder of TechCom Visions, said that he thought the financing is impossible to get and interest loans are too high. He believes that if the government and financing system were more conducive to entrepreneurial pursuits, then more people would want to start their own businesses. This sentiment was echoed by Alloysius, a co-founder of Farmerline, who also agreed that financing is very difficult to obtain. He also mentioned that high taxes are a challenge to entrepreneurs in Ghana.

In Suame Magazine, lack of capital is a challenge to starting a business. In addition, there exists a time barrier to entry for these types of businesses. This is due to the long apprenticeship period that the interview participants described. The apprenticeship period is also a barrier to innovation in Suame Magazine, and is described in more detail in Section 4.2.3. Kwaku Fosu, who runs Miracle Metalworks in Suame Magazine, spent ten years as an apprentice before leaving to start his own business. He stated that eight years is a normal length for an apprenticeship, and he stayed for an extra two years to “show his appreciation” to his master.

#### **4.1.2 Some Ghanaian entrepreneurs start businesses because there aren’t enough jobs.**

Several of the Ghanaian entrepreneurs we talked to were motivated to start their own business because they feel there aren’t enough jobs available to them. This was seen mostly in the college educated entrepreneurs we talked to. There seemed to be a feeling that the only jobs available for Ghanaian college graduates were government posts, and these jobs are limited. Another common feeling was that the salaries are lower for government jobs; this seemed like a more common feeling among less educated entrepreneurs.

In addition, Ghanaians want jobs that are secure. Kwaku is the CEO and founder of Loo Works, a sanitation company outside of Accra. In his interview he said that he started his business after his father was fired. When his father suddenly lost his job, his family’s mindset became that the only secure jobs were ones they created for themselves, and were very supportive of the entrepreneurial mindset and activities.

In Suame Magazine, the entrepreneurs started their own businesses after a period of apprenticeship to masters already in business. It did not seem common to stay an apprentice for longer than 8 or 10 years, and so many of these businesses are started by apprentices who reach the natural end to their apprenticeship.

Among the more educated innovators we spoke to, there was also a feeling that the jobs available were not interesting enough to hold their attention. Senyo Kelly,

the co-founder and CEO of SeKaf limited, graduated with a degree in Management Accounting from the University of Professional Studies in Legon. His parents wanted him to get a job, but he wanted to use his skills. During his national service, he worked as a teacher, but found the national service management very inefficient and confining for him.

McCarthy is the founder of Hop-In Academy, in Tamale, where he graduated with a degree from Tamale Polytechnic. He said that he believes in Ghana the only guaranteed jobs are medical careers and teaching jobs; he wanted to be a doctor, but was unable to make that happen, so he began to look into entrepreneurship.

David Asiamah, who founded and owns AgroMindset, an agriculture education provider, thinks that entrepreneurship is a necessity because there is not enough employment already. He believes that “entrepreneurs are the gamechangers” in terms of the employment market, because you are creating jobs for yourself and the others that you employ.

### **4.1.3 Some Ghanaian entrepreneurs start a business to solve a problem.**

While some entrepreneurs started their own businesses for more personal reasons, we also saw many who started a business to solve a specific problem. Johannes Arthur is a young entrepreneur based in Kumasi, who has been obsessed with the problem of waste since his undergraduate days. Although he initially fell into the furniture design industry because as a college student he simply could not afford to purchase furniture, he soon began repurposing plastic bottles to make furniture and then started to become passionate about waste management. He now believes that nothing is waste, and everything is just material in transit, and has started several new projects focused on waste management.

We spoke with several Ghanaian farmers who started their own innovative farms or teaching farms because they were passionate about the issue of farming education in Ghana. Kofi Boa started his own farm because he wanted to promote the idea of



conservation agriculture and farming by teaching Ghanaian farmers good practices and techniques. Portia Derry runs a reading/writing training clinic in Tamale for disadvantaged rural students, and she began innovating because she wanted to increase literacy among young people and eventually promote the Ghanaian creative writing industry. She was a teacher for her national service, and saw that there were many problems with the Ghanaian educational system; students did not know how to speak English, for example, but were still forced to write exams in English. She has a full time job apart from the clinics, and she uses part of her salary to fund the literacy clinics on weekends.

#### **4.1.4 Some Ghanaian businesses consist of a for-profit arm and a philanthropic arm within the same company.**

Several business-owners that we interviewed had set up a philanthropic arm of their business that operates in parallel with the for-profit section. The philanthropic arm was not necessarily related to the purpose of the for-profit arm of the business. Tsonom is a key example of this. His business, TechCOM Visions, is mostly for-profit, providing internet and technology solutions for companies. In addition to this, he has created EduBoost, a philanthropic initiative designed to increase technology usage in Ghanaian schools. Right now, the program involves four schools in Accra, but Tsonom is looking to expand to include more urban and rural schools.

Regina Agyare, the CEO and founder of Soronko, builds software for profit and simultaneously manages a non-profit side of her business called Tech Needs Girls. In this program, school-aged girls are taught how to code at weekly classes. She began philanthropic outreach early in starting her business, and has continued to grow and expand the philanthropic program.

We also found a correlation between gender and having a philanthropic arm of the business. All but one woman interviewed for this study had a philanthropic arm to her business. The one woman exception is Portia Derry, who runs the Funky Read and Write Clinic in Tamale, which is entirely a philanthropic endeavor. Portia Derry

created this clinic in order to bring African story books to African children. She noted that growing up there were few storybooks with black children, and in order for herself to become a successful creative writer, she needed to increase the amount of Ghanaians who enjoyed reading for fun. Portia commented on Ghanaians as only reading to learn, so most of the books they have in libraries are of a technical nature. At her clinic, she teaches her children to love writing and reading stories, especially those about Africans.

Many of the businesses in the study that are run by women are partly or entirely focused on philanthropic causes. Bernice, who is the CEO of Ghana Bamboo Bikes, has many philanthropic initiatives at work. She has worked with rural villages on menstrual health education, and advocates for the needs of rural and disenfranchised Ghanaians. She also is responsible for passing out TOMS shoes in rural areas in the Ashanti region. The Taimako family in Tamale also has both a for-profit and a non-profit side to their business in medicinal plants and natural healing. The business, founded by the sisters' mother, was designed to help organize and empower rural traditional healers from the beginning, which is a philanthropic goal. The company has grown to include a school in Tamale, and to sell Shea products, plants of all sorts, and employ over 100 workers at peak seasons. Finally, Samlara, the female entrepreneur from Accra, is launching a sanitation business designed to provide practical and affordable sanitation solutions for the urban poor. Samlara is hoping to start a business where she can employ a Ghanaian to be the owner of a latrine, and take care of cleaning and upkeep, and allow those who need access to use it for a small fee. Here, Samlara is offering an employment opportunity to someone who is need, and can train him to understand the microfinance structure to create his own living.

#### **4.1.5 Geography did not seem to impact the entrepreneurs' focuses.**

The study participants were spread across Accra, Kumasi, Tamale, and more rural areas in Ghana. Although there are definitely differences in the entrepreneurial climates of each location, these did not significantly affect the purposes or focuses of the businesses. This could be because even though Accra is closer to the coast, and thus would seem likely to be more connected to foreign investment, overall access to the internet can make any city connected.

We did not find a significant correlation between city and any of the other variables for which we ran correlations. Even Tamale, a city described as the NGO capital of Ghana, does not create more philanthropic businesses than any other city [7]. There are many philanthropic arms of businesses in Accra and Kumasi. In fact, one of the entrepreneurs from Tamale included in this study, Joshua, who created a farming business, worked for an NGO before starting his own venture. He noted the large overhead and bureaucratic style of the NGO as hindering the ability to make an impact. Perhaps this belief is held widely among the educated in Ghana, and therefore they have started their own philanthropic sectors of their businesses instead of relying on aid from foreigners.

Additionally, Accra, despite being more technologically-centered and connected to foreign investment, does not have more innovative businesses than any other city. It is important to note that there is selection bias in the sample in this study, but there are successful and innovative businesses all over the cities in Ghana, which are all trying to solve local problems. Although Accra is the largest city in Ghana and has the most access to capital, universities like KNUST and the University of Developmental Studies foster local innovation in Kumasi and Tamale as well.

## 4.2 Barriers to Innovation in Ghanaian Entrepreneurship

### 4.2.1 Lack of capital

Lack of capital was often cited as a challenge to entrepreneurship in Ghana, especially for businesses involving hardware. This was especially noticeable in the businesses located in Suame Magazine, where lack of capital makes it difficult to purchase materials ahead of customer orders. This seemed to be stifling innovation in this sector, because business-owners were financially constrained to only build exactly what customers order. This also affected their ability to advertise, because they could only show their products through images or brochures, as opposed to having extra physical models to demonstrate to customers.

It's interesting to note that lack of capital is much less challenging for software based businesses. After an initial investment (to purchase a computer, for example) the business can pretty much proceed for a while without any additional financial input. Software businesses are dependent on consistent electricity and internet access, however, which does present additional considerations.

The initial investment in software businesses also allows for much more flexibility later on; if you buy a computer with one business idea in mind, but then decide later to change focus, you don't need to purchase a new computer or even necessarily new software. However, if you invest in a certain type of mechanical or hardware business, it can be more difficult to pivot directions later and require more capital investment. Kwaku Fosu, the owner of Miracle Metal Works, a safe-manufacturing company in Suame Magazine, said that lack of capital to purchase his own machines is a challenge to his business. He often turns to ITTU's machines or to other craftsmen in Suame Magazine for help when he needs to use a machine that he does not own.

David Frimpong owns Frimpong Engineering, a company that specializes in making food processing machines in Suame Magazine. He said that capital is a big challenge for him. He described how he can only make a machine once one is ordered,

so in order to advertise his products he must rely on pamphlets, and then he has to wait for customer orders in order to pay for machines and materials. Abu Adams, the owner of a metalworking business that makes products out of sheet metals, also cited lack of capital as a challenge to his business. He said he has to rely on customers to come to him first before he can make anything. Now, Adams is stuck because business has been slow, meaning that he has no money to build. He can't expand or do any work, even though they have the technology and skills, because of financial limitations.

### **4.2.2 Infrastructure Challenges**

Kwaku Fosu said that lack of electricity was a challenge that he faced in his business, due to power outages in Kumasi. Montari Seidu dealt with power outages by switching to small manual machines to continue production when there was no electricity. The infrastructure challenges were so significant for Seidu that he has actually begun designing his own manual machines that they can use without electricity to more successfully cope with the infrastructure challenges presented to them.

Lack of access to the internet or reliable electricity to charge computers is also a challenge for software businesses. These infrastructure challenges seemed to be the motivating factor for the creation of start-up accelerators and group-working spaces. These types of buildings share the cost of internet access, for example, making it worthwhile for the companies involved. However, infrastructure challenges create a barrier to innovation because they limit the scope of the business and sometimes even limit the amount of work a single entrepreneur can accomplish in a given amount of time.

### **4.2.3 Apprenticeship systems in Suame Magazine**

One interesting phenomenon is the apprenticeship system that occurs in Suame Magazine. The tradition there, corroborated by many business-owners, is to hire apprentices as labor for their businesses. These apprentices are not paid as much as more

traditional employees would be, and generally stay for 6-8 years at the business. Employees that have more skills are usually referred to as “masters.” After an apprentice has worked at a business for 6-8 years, the tradition is to leave the shop and start his own business. However, the problem here is that the trade that the apprentice knows best is the original trade of his master, meaning that the new business that gets started is often identical to the original business. This puts masters in a difficult position – they often need the labor provided by apprentices, but then have to deal with the consequences of apprentices leaving and becoming competition.

This problem was described by Ibrahim Musah, the owner of a casting shop in Suame Magazine. Ibrahim described how he has trained many apprentices, even though they then leave and start businesses which compete with his own just out of necessity. He said that apprentices become his main competition, and take clients away from him; however, he said that in order to run his own business at all, he needs apprentices, because he can’t do everything himself.

Montari Seidu, the owner of Montals Engineering, a stove manufacturing company in Suame Magazine, said that he carefully specializes his apprentices and masters to help prevent this problem from happening. Montals Engineering was one of the largest companies we spoke to in Suame Magazine, with 28 masters and 8 apprentices. Seidu trains his masters in specialized, small parts of the stove; this means that if they leave his business, they don’t immediately have the skills to be a serious competitive threat. However, it means that if Montari is not there, the masters can still run the business. When asked about challenges facing Ghanaian entrepreneurs, Montari mentioned that stealing other people’s ideas is a huge problem.

## 4.3 Correlations with Entrepreneurial Innovation in Ghana

### 4.3.1 College Education

The correlations showed statistically significant evidence that the entrepreneurs with college educations have more innovative businesses. The figure shown here exemplifies the difference of means, and shows the result of the t test to be significant with a p of less than 0.005. Therefore, based on our study, entrepreneurs with college degrees tended also to lead more innovative businesses. There are many success stories from the experiences of the entrepreneurs of this study that show how important their college experience was.

In the case of Regina, the CEO of a technology communications business in Accra, she was inspired to critically think in college. Her college experience also provided her with the tools of entrepreneurship that she did not even believe were important at the time. Her college, Ashesi, which is one of the most progressive colleges in Ghana, is based off of Swarthmore College in the United States. Regina explained that Ashesi focuses more on critical thinking, while other universities in Ghana rely more on memorization. Ashesi focuses on extrapolating concepts taught in class and applying them to third world problems. In many classes, Ashesi asks for group collaboration, and decision-making even though there is no clear-cut answer, thus learning how to reason through situations without all the information, as no one has going through life. Ashesi also requires freshmen to take entrepreneurship classes and computer science classes, which sparked her interest in computer science.

College education provides not only a higher level of education and critical thinking, but also provides connections to other intelligent and motivated people. In the case of Farmerline, which is a mobile farming app, that disseminates helpful information to farmers via SMS and voice platforms, was started by two graduates of KNUST, or Kwame Nkrumah University of Science and Technology in Kumasi. Alloysius, the CEO of Farmerline, and Emmanuel, the CTO connected instantly at KNUST because

both had a background in agriculture, and wanted to use their knowledge and skill-set to increase higher incomes for Farmers. Alloysius grew up watching his aunt, who was a small-scale farmer, not understand the weather patterns and market prices for her crops, which limited her income and efficiency as a farmer. Emmanuel grew up watching his mother care for farmers in her clinic, and witnessed how farmers could not pay for her medical services or food at school. Both were united in increased the income of small-scale farmers by providing them with knowledge that could help their yield and the prices of their crops at market. The two of them both attended the World Wide Web conference in Accra for three weeks, and the idea of Farmerline was born. Without their shared experience at KNUST, they would not have found each other, and built this successful platform for farmers.

Jorge Appiah, an entrepreneur from Kumasi, is both the co-founder of a solar panel consultation and installation company and the executive director the Creativity Group. The Creativity Group is a non-profit located on the KNUST campus where students can solve problems through entrepreneurship. Jorge launched the Creativity Group when he attended KNUST as an electrical engineer. Jorge found himself frustrated with the students at KNUST who were there to just pass exams, and wanted a platform to encourage innovation, especially for social problems that affect Ghanaians. As a result of his time at KNUST and his involvement with the Creativity Group, students no longer feel as though their ideas and class projects cannot be taken to market. Instead, college projects which are labored over so intently during the semester do not have to be abandoned at the end of term, but can now be turned into ventures by classmates. Jorge continues to work with the Creativity Group and as a researcher for KNUST because he believes strongly that the skills he teaches and the outlets which the Creativity Group provides, including a maker space and different hack-a-thons or gatherings of likeminded individuals for brainstorming.

### **4.3.2 Role models and innovativeness of philanthropic arm**

Additionally, it is interesting to note that people who have role models are more likely to have an innovative business with a philanthropic arm. This result is statistically



significant with a p-value of 0.0357 shown in Appendix B.

Among many of the successful entrepreneurs, it was a common theme for each to have a for-profit and a non-profit side of their company. In most cases, the non-profit side is funded with the profit from the for-profit side, which shows a philanthropic attitude of successful entrepreneurs. Although these two characteristics might seem unrelated, a common theme for the entrepreneurs of this study is noting that their role models tended to be philanthropic with their success stories.

For example, Tsonam, the CEO of a technology communications business in Accra called TechCOM Visions, has an entire sector of his business, called EduBoost, focused on education in Accra, and increasing computer access for children. EduBoost has programs in 4 schools, where students pay a small fee, but students and teachers alike learn how to incorporate technology into their daily lives. Two thousands students are currently participating. Interestingly enough, Tsonam also attributes much of his success in both his for-profit and nonprofit sides of his business to motivation from western entrepreneurs including Bill Gates. Bill Gates is incredibly philanthropic, most notably through the Gates Foundation, which gives back to society in many ways including investing in technologies for the developing world, and disseminating them effectively. Tsonam, through the inspiration of his successful role models, too is using his success to fund philanthropic projects like EduBoost which will serve as a stepping stone for teaching Africans in Accra about technology.

Additionally, Johannes, the CEO of Waste Factor, which is a company just getting off the ground in Kumasi where waste is turned into usable products, including furniture from water bottles, and handbags from the plastic satchels of water, has an entire nonprofit sector of his business planned for when he incorporates. Although Johannes is in an earlier stage of business development than Tsonam, he understands the importance of having a sustainable solution to the growing waste problem in Ghana. Johannes's role models include President Barack Obama and those involved in waste initiatives in the United States. Johannes even had the chance to work in Philadelphia through the Young African Leaders Initiative, and learned about the United States' system of terracycle, and the importance of separation in recycling,

compost and trash collection. Motivated by the United States' system, Johannes is looking to launch both the for-profit and nonprofit sides to his business this year. The for-profit business will include creating usable goods like furniture ranging from sofas to beds to tables out of water bottles. The non-profit part of his business will include educational initiatives such as teaching people how to separate waste. Johannes also wants to educate people of Ghana to understand that climate change is related to increased waste production. Inspired by his role models to continue advocating for more sophisticated waste management in Ghana, and through educational initiatives, Johannes hopes to achieve his goal of clean, waste-free streets in Ghana.

Moreover, Kofi Boa, a farmer outside of Kumasi has created an entire teaching farm for his No-Till Agriculture techniques. Kofi Boa, understanding the complexities around food safety due to years of training and studying agriculture both in Ghana and abroad, has advocated all his life for more farmer education, especially as he has watched the decrease farmland and declining yields from the land left. Many Ghanaian farmers still practice slash-and-burn agriculture. However, Kofi Boa advocates for no-till agriculture, where farmers plant a cover crop to protect the top layer of soil, and do not till their fields, which can break the capillaries in the soil and depletes the groundwater. Due to his knowledge and the yields of his farm, Kofi has gotten national and international attention. Most notably, Howard Buffet has offered Kofi resources to build a teaching farm. Inspired by the generosity of his role model, Howard Buffet, and motivated by goal of creating a food-safe nation, Kofi has set up a teaching farm free of charge for farmers around Ghana to learn about No-Till Agriculture. Here, farmers learn the science behind keeping a cover crop to protect the soil from top-level evaporation. Kofi also has each farmer practice the skills he teaches alongside him on the farm, especially due to the amount of illiterate farmers in Ghana. Kofi is a philanthropic figure around Kumasi and the agriculture community at large.

## Chapter 5

# Recommendations Regarding Ghanaian Entrepreneurship

This section presents some recommendations aimed at Ghanaian entrepreneurs, based on the findings from the previous section. Once again, it should be noted that because the study participants were not selected rigorously, our findings are not valid beyond the limits of the study. However, we do believe there is a lot to be learned from the interview data we collected. The entrepreneurs that participated in this study show a unique cross-section of the entrepreneurship climate in Ghana, and overall they reveal some important trends that can inform recommendations.

For all entrepreneurs, going to university seems to be crucial to success. Universities offer an education, but also a network of likeminded Ghanaians and alumni that can offer support and advice through the entrepreneurship process. By observing companies in the seed stages through those making a splash throughout the nation, it is clear that the necessary support and some of the most important connections came from the university days of each entrepreneur. Encouraging tertiary education, and creating a more affordable college system in Ghana will be vital to innovation in the country. Additionally, the education at some of the private universities, including Ashesi, is more eye opening and encouraging of entrepreneurship than some of the older public universities. As more private colleges open up in Ghana, the education system should be modified to encourage more entrepreneurship as jobs in the formal

sector are less common.

At KNUST, a very innovative group on campus is the Creativity Group, which is known for hosting hack-a-thons for idea generation and turning school projects into businesses. The Creativity Group has many resources including lab space, and prototyping materials to allow students the freedom of creation and innovation. The Creativity Group has a following of motivated students who are interested in entrepreneurship. They are an invaluable resource for beginning entrepreneurs at KNUST. The guidance and leadership from those who are leading the Creativity Group and the connections to entrepreneurs in Kumasi and beyond will serve as role models for any budding university students looking to take their school projects beyond the end of term.

For agricultural businesses, the most successful in Ghana occur when the farmer is well-educated and as a fundamental understanding of the lack of food security of the nation. The most successful agricultural experts have had the chance to learn about farming in academic settings as well as learn by farming on a daily basis. Education of proper growing techniques sets apart the farmers from the growers, and will return much better yields from the fields than before. In order to produce a better generation of agricultural businesses, education should be the primary focus.

## **5.1 Entrepreneurs in Accra**

- Accra is filled with many startup accelerators, which beyond having connections to seed funding and other smart, driven entrepreneurs both working for accelerators and using the co-working space, also have power and internet on a consistent basis. Due to the expense of power, and the inefficient schedule that Accra has mandated, the most appealing part of a startup accelerator might be sharing the cost of power among many businesses, and therefore making it more affordable. Most businesses at some level rely on power for operation, and startup accelerators can help overcome this infrastructure challenge. If an entrepreneur is lacking the funding to build out this infrastructure for him or

herself, it is advisable to join an accelerator until the business can afford this necessity on its own.

- Create a business model such that you are not relied on daily. Have a business that can sustain the absence of the CEO by delegating tasks well to the subordinate employees. Hire those who have also gone to a university and have had experience with programming.
- In order to be productive the most hours out of the day, invest in a generator that will allow the business to operate even with the fluctuating power. Without reliable access to power, the business will not be able to succeed.
- Have a philanthropic arm of the business that is involved with outreach of technology. The world is moving toward a more technology focus, and the best way to keep Ghanaians on the curve will be to have the youth literate in computers and technology. Whether it be by donating equipment or creating workshops for children, make sure that technology education is making its way into school systems.

## **5.2 Entrepreneurs in Suame Magazine**

- Entrepreneurs in Suame Magazine have to utilize the resources at their disposal, including the help from ITTU and their neighbors. The atmosphere of collaboration for machinery and parts will allow businesses to be successful. However, to beat out the competition, masters must learn to train their apprentices in only specific parts of their trade. By not allowing their apprentices to learn all of their trade secrets, their apprentices cannot steal part of their market share when their apprenticeship has ended, and start the same type of business down the road. By specializing their apprentice, hopefully the master can take on his apprentice as a full-time employee, and grow out his business instead of losing the apprentice altogether.

- Specialize apprentices: carefully train apprentices in one type of skill necessary for your business, so that none of them have all of the knowledge and therefore it is more difficult for them to leave and start a competing business. To make your business a more attractive place to work, offer apprentices the promotion to Specialized Master after a determined number of years; in this way, you can be sure to have skilled, committed employees, and there is still economic benefit for the apprentices/masters involved
- When at all possible, locate the business near a centralized manufacturing facility (for example, ITTU). This allows the use of machines and equipment for special orders without having to purchase the equipment.
- The business should have employees that are sufficiently skilled to continue work even if the master/business owner is not present.

# Chapter 6

## Summary and Conclusions

This section describes the main findings from this research. First, the conclusions regarding entrepreneurship in Ghana are summarized. Sections 6.1 and 6.2 detail the conclusions developed regarding research methods and future work.

The conclusions from this paper fall into two categories. The first category relates to the more exploratory research purpose of this project and details descriptive findings gleaned from the interviews. The second category relates to barriers to innovation in Ghana – what are they, and how can they best be alleviated?

**What is Ghanaian innovation and entrepreneurship?** In Ghana, entrepreneurship does not always include innovation. One of the most significant areas of our research was the exploration of the distinction between entrepreneurship and innovation. Starting a business in Ghana does not mean that this business is significantly innovative in the field or different than those around it. However, the more innovative entrepreneurs seemed to receive more recognition and be doing better overall. More research should be done into the intersection of innovation and entrepreneurship.

Key findings from this research about Ghanaian entrepreneurship include that some study participants found it relatively easy to start a business. Many Ghanaians find it easy to start a business because the informal private sector accounts for a majority of the employees in Ghana, and therefore many businesses do not follow the setup outlined in Chapter 2. Instead, starting an informal private sector company is

not looked at as challenging to many entrepreneurs included in this study.

Ghanaians are initially interested in entrepreneurship due to the lack of jobs available. Jobs in the formal public and private sector are not available to all the Ghanaians entering the workforce annually, and therefore Ghanaians need to start their own businesses to create a place for themselves in the workforce.

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Ghanaians also start businesses in order to solve local problems. Ghanaians who have grown up living with problems including poor management of human waste, poor management of recycling and compost goods, or inefficiencies within telecommunications programs inspires Ghanaians to create change in their own nation through the instrument of a successful business.

The participants in this study who attended universities tended to have more innovative businesses. Whether their college education gave them an opportunity to join a club that encouraged business practices or an entrepreneurial mindset, an entrepreneur met their future co-founder at university, or that the education provided an entrepreneur with the tools he or she needed to be successful, the college-educated participants created businesses that continued to innovate and solve problems more effectively than the study participants who did not attend university.

Ghanaians are motivated to start businesses that have for-profit and philanthropic arms within the same company. Many times, the for-profit side will fund the philanthropic arm. The motivation for creating the philanthropic side often stems from contributing their success to opportunities that not everyone in Ghana is given, and giving back to the community at large skills or services that will help increase innovation, education, and critical thinking within Ghana. Many entrepreneurs who started businesses with philanthropic arms were motivated by strong role models, who also have philanthropic visions.

The location of the business did not impact the entrepreneurs' focuses, innova-



tion, or business size. Although Accra has much more access to capital, businesses in Kumasi, Tamale and Ejura all had innovative ideas and business models. Additionally, even though Tamale is known as the NGO capital of Ghana, businesses set up in Tamale are not all philanthropic in nature. Internet access has allowed Ghana as a whole to become more connected to resources including financial opportunities, and access to education on business structure, and therefore this study showed no differences between innovation of businesses as it related to where the business was located.

**What are barriers to innovation in Ghana?** Throughout our interviews, we noticed that many Ghanaian entrepreneurs seem limited in their capacity to innovate. This meant that while they were very entrepreneurial, and were actively trying to make money and grow a sustainable business, they found it difficult to branch out or try new ideas. This limited their creativity, and ultimately their potential to be truly innovative or different.

The main barriers to entrepreneurial innovation that are noted in this study include the lack of capital available. Access to capital is difficult across Ghana. In many cases, entrepreneurs do not have the capital to create new products before orders are placed, and therefore are only relying on customers ordering products from brochures or as a result of positive word of mouth from other customers. Creativity without capital is a large barrier to innovation for entrepreneurs in Ghana.

Another barrier to innovation are infrastructure challenges. The lack of reliable power can hinder production. Accra runs on a cycle of 12 hours on and 24 hours off of power. However, buying generators and fuel is very expensive, and is not affordable for all entrepreneurs. Other infrastructure challenges include lack of internet access nationwide. In Tamale, reliable internet is much less common than Kumasi or Accra, and Ejura had no reliable internet access. This creates an infrastructure challenge to software-focused entrepreneurs, and impacts where a software company would want to be located in Ghana.

Finally, the apprenticeship system of Suame Magazine could be stopping any one

business from becoming more successful. Apprentices will learn from their master, and after they have mastered a trade, will start their own business and take market share from their master. However, masters are willing to continue this system because apprentices are necessary for continuing production; they are a great source of cheap labor, and many masters were once apprentices themselves. However, the continuous splitting of market share, and the copy-paste style of businesses set up, stops any one entrepreneur in Suame Magazine from holding a monopoly on a business.

## **6.1 Local Innovation Research**

Conducting the research for this project was very involved, and required a great deal of coordination. In terms of future research projects, some basic recommendations are as follows.

- Visiting rural areas is hard logistically to coordinate lodging, especially in a short period of time.
- Insufficient understanding of Ghanaian culture at the start led to shifting focus of the interviews as local knowledge was gained during the research period.
- It would be beneficial to do follow-up interviews with the local innovators, but this is not always feasible based on the timeline of the research.
- Choosing which innovators and entrepreneurs to interview should be a primary focus. As this research was more exploratory, we were not very selective when choosing interview participants in order to maximize our limited time in each city. Initial mapping projects and exploratory research could benefit from a focus on quantity of research, but more targeted projects should focus more on selecting specific individuals.

## **6.2 Future Work**

This research was broad and preliminary, so there are many avenues for future inquiry. Specifically, a research project with a defined focus on rural innovation would

be useful. Rural areas are more logistically challenging to visit, and have a lower population density (and therefore density of innovators). We had a very limited time in country, so it made more sense for us to spend our time in cities where we could interview more people in a shorter period of time. Another future project would be to focus on female entrepreneurs; we were only able to locate a handful of them out of all of our interviews, and we are unclear as to why they were suggested less often for us to talk to (perhaps there are fewer female entrepreneurs? Or perhaps they are less innovative?). Future research projects would also benefit from a longer period of time in country. This would allow more time to locate innovators for interviews, and potentially the ability to conduct follow-up interviews with innovators, which would help tell their stories in a more complete and accurate manner. Another way to structure a future research project would be to look at a specific sector of local entrepreneurship, because it would make locating interview participants easier.

Another future line of inquiry could be investigating the way Western influence interplays with Ghanaian innovation. There is a lot of western influence which affects the definition of “local” innovation, especially in the context of IDIN’s other work in Ghana. Do “local innovators” have to be completely Ghanaian educated to qualify as such? Additionally, are you a local innovator if your process is heavily influenced by an NGO or Peace Corps Volunteer?



# Appendix A

## Interview Protocol

The following interview protocol

### INTERVIEW PROTOCOL

For individuals who have been identified as “a local innovator” or entrepreneur.

Introductory Script:

**Estimated length of interview:** 60-90 minutes

**Format of interview:** in-person

**Language of interview:** English (whenever possible), or local language/dialect with translator.

**Introduction of the study to interviewees:** Thank you for taking the time to speak to me today; I really appreciate it. We are interested in speaking with you because we have learned about an innovation that you have created/participated in creating, which we are interested in learning more about as part of a project to better understand how local innovations happen. We are interested in learning more about how this innovation has been developed, the factors that have contributed to the process, as well as barriers or challenges you might have encountered.

**Overview of the informed consent process:** Our interview should last between an hour and 90 minutes, depending on how long you are available and interested to speak to me. To make sure I can document what you tell me accurately, I would

like to digitally record our conversation. Is that something you would be comfortable with?

Also, if you are willing, we would like to use your name in association with quotes we may include from you in publications that may result from this research; however this is entirely optional and if you prefer to have your statements remain anonymous we can provide any level of confidentiality and anonymity that would work best for you.

This information, along with some other important information about the interview, is included on a consent form that I have here. Before we start the interview, it is helpful if we can go through this form together to make sure to have a chance to address any questions you might have about the interview. I can give you a few minutes to read the form, or I'd be happy to go over it verbally with you, whichever you would prefer.

[Wait until they have finished reading/understood the verbal explanation] Do you have any questions about the informed consent process?

If you consent to participate, can you please sign the form?

[if they consent to participate, then continue with remainder of the interview]:

## **INTERVIEW QUESTIONS:**

### **Part 1: Understanding the specific innovation that has been or is being created:**

1. To start, tell me about this innovation/business—what is it trying to do and how does it work?

Follow-up questions:

- (a) Technical dimension: how does it work?
  - (b) Business dimension: who are your customers?
2. How does this improve the quality of life for the people using it or the community?

Probes: What is this intended to do/make better? what challenge is it addressing and for whom?

3. In what ways is this a change from way things were done before or are currently being done?

Follow-up questions:

- (a) How is it better than existing approaches and what is it trying to do better?
  - (b) How is it different than existing approaches? What is it trying to do differently than before?
  - (c) Is it a new solution to an existing challenge? Is it addressing a new opportunity or challenge that has not been addressed before?
  - (d) For a business: who is your competition?
4. Who else that you are aware of is doing or has tried to do something similar?  
Probe: have you heard about or seen people trying to do something similar in other places?

**Part 2: Understanding the process that resulted in or is currently creating this innovation:**

5. Idea origin—how did the idea for this innovation first come about and where did the idea come from? Probe: who did the idea/ideas come from? what people were involved? Follow-up: What inspiration or influences were drawn upon?
6. I'd like to hear more about the story of how this developed from an idea to where it is today. Can you walk me through how this project has developed to the point it is at now, starting at the beginning?
7. Have there been any moments where you have had to re-think or change what you're doing and if so, could you tell me about those moments?  
  
(if not already clear, follow up to get more detail on these points in particular):

8. Now I'd like to know more about the different people and organizations who have played a role in this process so far. Who have been the main people involved so far and can you tell me about how they have been a part of the process?

Follow-up questions to understand:

- (a) Who each of these stakeholders is
  - (b) What role each stakeholder has played;
  - (c) How they are connected/related to each other (who is working with whom, how they interface with each other in the process).
9. Have there been other people who have played a role either in helping this move forward or in complicating the process or making it harder? If so, follow-up questions to understand these people and their roles

**Part 3: Questions about the innovator, his/her background and what he/she brings in terms of skills, knowledge, and resources to the process.**

5. Now I'd like to hear more about your background, and particularly what your primary activities were before you started working on this project? Where were you raised?

Follow-ups:

- (a) Are you still doing those other activities?
  - (b) What are the ways in which you make a living?
  - (c) What do your parents do?
  - (d) Were your parents supportive of you starting your own business?
6. Could you tell me about your experience in school? How much schooling did you attend, and what did you study?
7. How did you learn to do the things you are now doing as part of your work on this project?



Probes/Follow-ups:

- (a) What types of training have you received, both formal and informal?
  - (b) What is your educational background?
  - (c) What type of training do you wish you had access to?
8. When you need help or assistance solving a problem or dealing with an issue on the project, who are some of the people that you know you can go to for help?

Follow-up:

- (a) Are there any specific ways in which these people have helped you to move this project forward?
9. Other demographics: how long have you lived in this community and how long has your family been here?

Probe: how old are you? (if not obvious from previous answer)

**Part 4: Questions about the local context and the role of the context in the innovation process**

5. In thinking about how you have developed this innovation to where it is now, what have been the main resources you have used?
- a. Probes: Materials, funding, ideas, space, tools, etc.?

Follow up questions:

- (a) Which of these are local and which (if any) have come from outside the community?
  - (b) What have been the most important resources and supports, without which you would not have been able to keep developing this project?
6. What have been some of the challenges you've faced so far in the process and how did you address those challenges?

7. What are the most important things that need to happen in order for this innovation to spread? (to be used more widely by many more people?)
8. Do you have any role models that have inspired you through your journey of starting a business?
  - a. Follow-up to explore barriers and enablers.

**Part 5: Wrapping Up and Referrals:**

5. Reflecting on what we've talked about, is there anything else about this innovation and how it's been created or how it's changing things here that you feel it's important for me to know?
6. As you know, we're interested in speaking to many different innovators such as yourself, so we'd be interested to know if there are any other people in your community or that you know of in this region who are innovators you think we should speak to?

# Appendix B

## Correlation Plots

### Correlation Plots and Information for Statistical Analysis

#### B.1 Chi-Squared Test

The Mosaic chart shown here is the statistical analysis for two binary trends, Gender versus Having a Philanthropic Arm or not. A mosaic chart determines the likelihood of a binary trend holding significance through the chi-squared test, which is shown below the mosaic chart.

The Chi-Squared statistical test is useful for testing null hypotheses, or that there is no statistical significance between the observed and expected value. In this case, the null hypothesis is that there is no statistical significance between men and women having or not having a philanthropic arm. The equation used to calculate chi squared is

$$\chi^2 = \sum (o - e)^2 / e \tag{B.1}$$

Figure B-1 shows the results of the Mosaic Plot for Philanthropic Arm and Gender. A Mosaic Plot is a statistical tool used to look at qualitative data. This plot is fitting for this analysis because both gender and presence of a philanthropic arm are binary variables. From Figure B-1, it is apparent that

females (although there is a smaller number of females which is shown by the narrower column of 1 versus 0) are more likely to have a philanthropic arm of their business, which is represented by the much larger portion of the column being colored blue. Figure B-2 shows the results from the chi-square test which shows statistical significance.

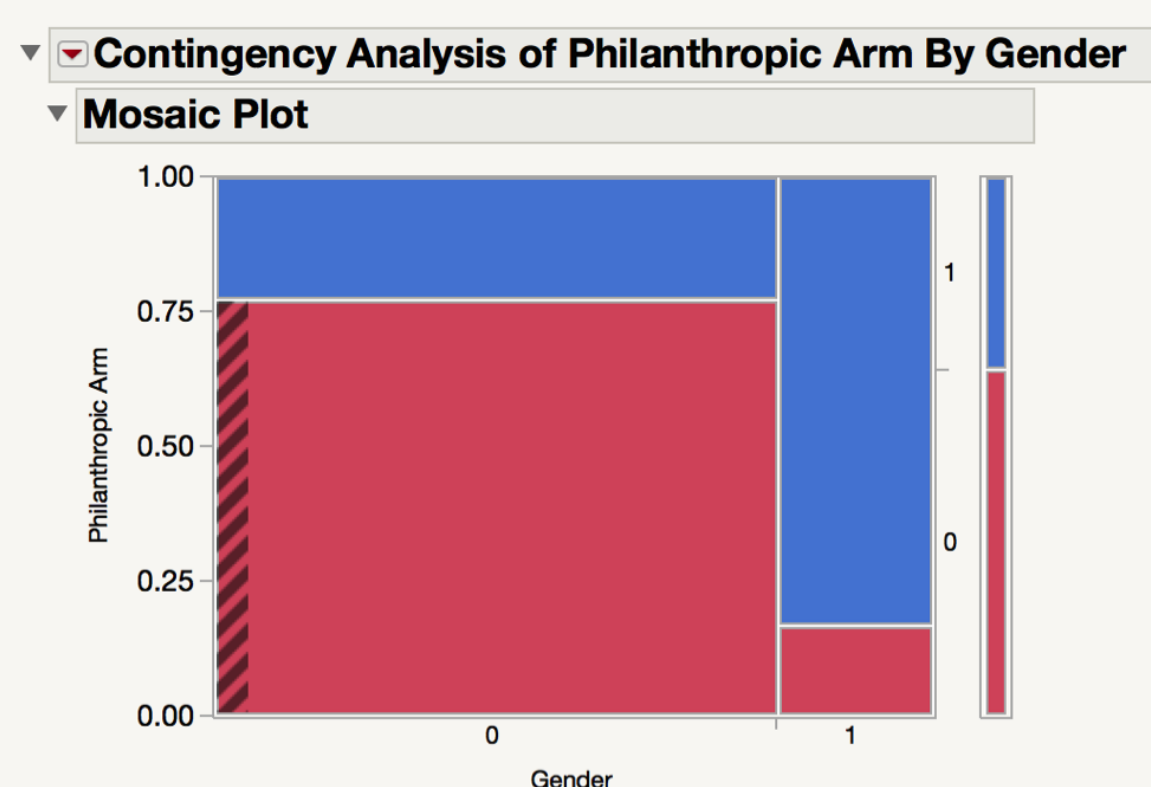


Figure B-1: The Mosaic Plot for Philanthropic Arm versus Gender

## B.2 One-Way Variance Analysis

The One-way Variance Analysis shown below are calculated by defining the independent variable and the dependent variable, and analyzing a difference of variance among the data set. The diamond shapes shown here show lower and upper quartiles as well as the mean, which is shown by the widest part of the diamond.

ANOVA, or analysis of variance, is the statistical test shown by the charts.

▼ Tests			
N	DF	-LogLike	RSquare (U)
28	1	3.7546989	0.2057
Test	ChiSquare	Prob>ChiSq	
Likelihood Ratio	7.509	0.0061*	
Pearson	7.542	0.0060*	
Fisher's Exact Test	Prob	Alternative Hypothesis	
Left	0.9994	Prob(Philanthropic Arm=1) is greater for Gender=0 than 1	
Right	0.0126*	Prob(Philanthropic Arm=1) is greater for Gender=1 than 0	
2-Tail	0.0126*	Prob(Philanthropic Arm=1) is different across Gender	

Figure B-2: The chi-squared test results for Philanthropic Arm versus Gender

Variance of X is described mathematically as the expected value of the squared deviation from the mean =  $E[X]$ :

$$Variance = E[(X - \mu)^2] \tag{B.2}$$

The one-way analysis of variance sets a null hypothesis that the means of the two sets of data are statistically not different. If the test shows statistical significance, it can be stated that the means are different from each other. In the case of the data, the ANOVA showed statistically significantly different means for the following:

- (a) Innovativeness of Philanthropic Arm by Gender
- (b) Innovativeness of Business by College Educated
- (c) Innovativeness of Philanthropic Arm by Role Models

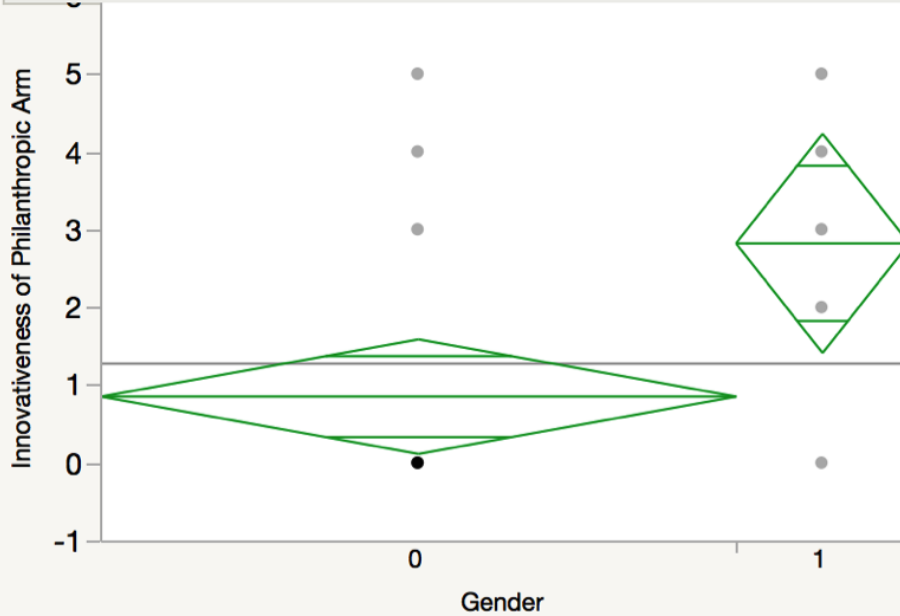
Therefore, these three findings show trends within the data we collected to show that women were more likely to have an innovative philanthropic arm; college educated entrepreneurs were more likely to have a more innovative business; and those entrepreneurs with Role Models were more likely to have an innovative

philanthropic arm. These conclusions are not for extrapolation to entrepreneurship in Ghana as a whole, but as trends within the study. Figures B-3, B-4, and B-5 show the statistical significance and p-values of these trends calculated mathematically.

A notable finding is also that there is no difference among any city in terms of innovation, business size, presence of philanthropic arm, or innovativeness of a philanthropic arm. This trend can be seen mathematically in Figure B-6.

For the variables used to recreate this statistical analysis, please contact the authors. For privacy reasons, the variable assignments for each business has been omitted from this paper.

▼ **Oneway Analysis of Innovativeness of Philanthropic Arm By Gender**



▼ **Oneway Anova**

▼ **Summary of Fit**

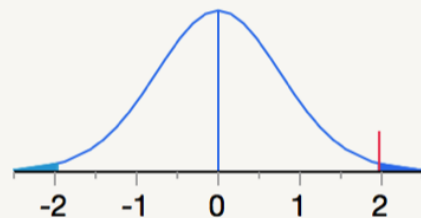
Rsquare	0.199424
Adj Rsquare	0.168633
Root Mean Square Error	1.680479
Mean of Response	1.285714
Observations (or Sum Wgts)	28

▼ **t Test**

1-0

Assuming equal variances

Difference	1.96970	t Ratio	2.544921
Std Err Dif	0.77397	DF	26
Upper CL Dif	3.56062	Prob >  t	0.0172*
Lower CL Dif	0.37878	Prob > t	0.0086*
Confidence	0.95	Prob < t	0.9914



▼ **Analysis of Variance**

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Gender	1	18.290043	18.2900	6.4766	0.0172*
Error	26	73.424242	2.8240		
C. Total	27	91.714286			

Figure B-3: The ANOVA Plot for Innovativeness of Philanthropic Arm versus Gender





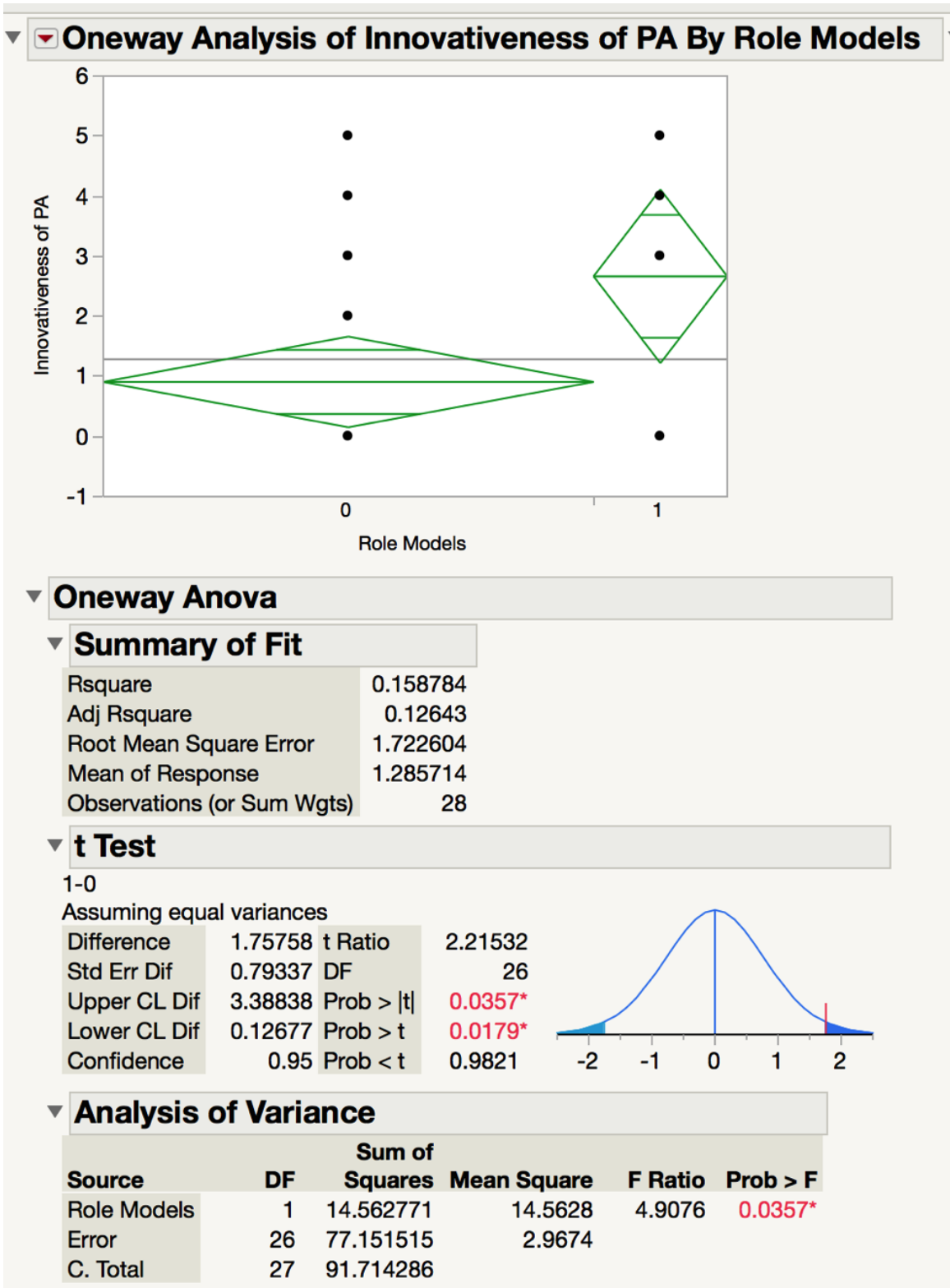


Figure B-5: The ANOVA Plot for Innovativeness of Philanthropic Arm versus Role Models

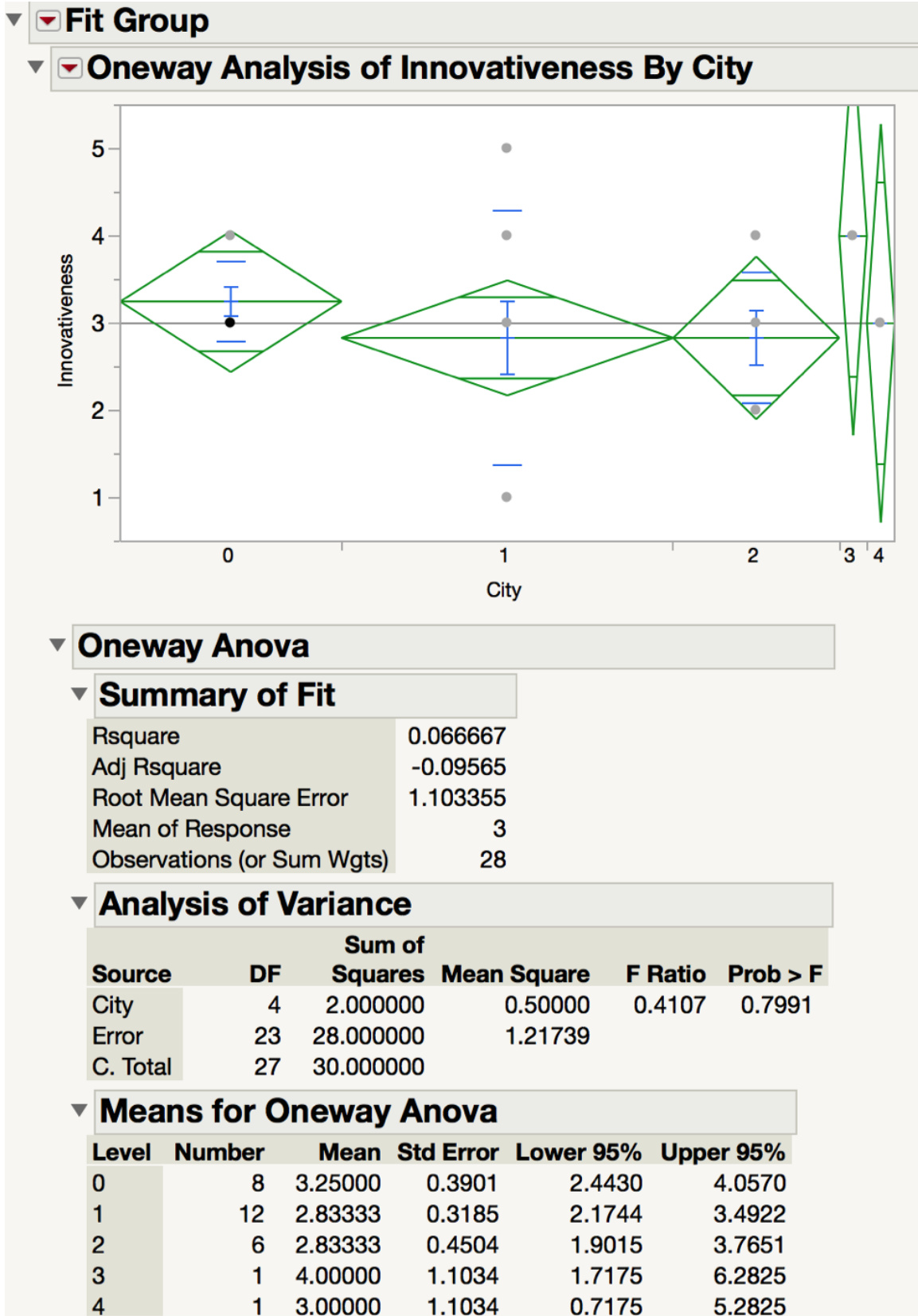


Figure B-6: The ANOVA Plot of Innovativeness versus City

# Appendix C

## Consent Form

### CONSENT TO PARTICIPATE IN INTERVIEW<sup>1</sup>

**Study Title:** Learning from Local Innovators: How Community-Based Innovation Happens

You are being asked to participate in a research study conducted by Elizabeth Hoffecker Moreno from D-Lab's International Development Innovation Network at the Massachusetts Institute of Technology (M.I.T.). Additional researchers assisting with this study include Asresh Guttikonda, Grace Connors, Jessie Press-Williams, and Pierce Gordon, who are graduate and undergraduate students at MIT and UC Berkeley respectively. The purpose of the study is to learn about processes of local, community-based innovation, including the factors and conditions that enable these processes and the results that these processes produce for participants and key stakeholders.

You were selected as a possible participant in this study because you have been identified by members of a local organization or by researchers as someone who has participated in a local innovation process that we are studying. You may also have been identified because you work with an organization or group that has been involved in or associated with one of the innovation processes we are studying.

Please carefully read the information below, and ask questions about anything that may be unclear, before deciding whether or not to participate in the interview.

- This interview is voluntary. You are free to answer questions however you choose and have the right not to answer any question(s) at any time. You can also choose to stop the interview at any time and for any reason, without the need to provide an explanation.
- We expect that the interview will last about an hour, but can extend slightly longer if there is additional material you feel it is important to cover. The maximum length of the interview will not exceed 90 minutes.
- You will not be offered financial compensation for your participation in this interview.
- We would like to digitally record this interview so that we can use it for reference while proceeding with this study. However, we will only record this interview with your stated permission. If you do

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<sup>1</sup>This consent form was written by Elizabeth Hoffecker Moreno, and is used in agreement with her for the purposes for this research and the IDIN Summer Research Fellowship.

grant permission for this conversation to be recorded, you can ask to stop the recording at any time, and can also revoke recording permission and/or end the interview at any time.

- If you grant permission to do so, we would like to use your name and title in association with quotes we may include from you in publications that may result from this research. If you choose not to grant this permission, we would request to ascribe content provided by you to a generic title, such as “researcher” or “staff from a development organization.” If you wish to remain completely anonymous, you may also request so and no information from this interview will be linked to you or your identity in any way. Whether or not you request anonymity, you may also request that some or all information you provide remain confidential (meaning it will not be shared with anyone else or included in any publication that may result from this research).

This project will be completed by August 30, 2016. All interview recordings will be stored in a secure, password-protected digital workspace (folder) belonging to one or more members of the research team until September 30, 2017. The recordings will then be transferred to permanent, secure storage belonging to D-Lab, or deleted.

Please review the following in order to provide your consent:

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

(Please check all that apply)

I give permission for this interview to be digitally recorded.

I give permission for the following information to be included in publications resulting from this study:

my name  my title  direct quotes from this interview

Name of Interviewee \_\_\_\_\_

Signature of Interviewee \_\_\_\_\_ Date \_\_\_\_\_

Signature of Researcher \_\_\_\_\_ Date \_\_\_\_\_

Please contact Elizabeth Hoffecker Moreno with any questions or concerns.

**Principal Researcher Contact Info:**

Elizabeth Hoffecker Moreno Research Coordinator, International Development Innovation Network D-Lab, Massachusetts Institute of Technology MIT N51 Building, 265 Massachusetts Ave. Cambridge, MA 02139  
Email: ehm@mit.edu Phone: 617-324-7621

If you feel you have been treated unfairly, or you have questions regarding your rights as a research subject, you may contact the Chairman of the Committee on the Use of Humans as Experimental Subjects, M.I.T., Room E25-143b, 77 Massachusetts Ave, Cambridge, MA 02139, phone 1-617-253-6787.

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