

Network Science Center Research Team's Visit to Addis Ababa, Ethiopia

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A team of two cadets, Evan Szablowski and Zachary Langhans and Senior Researcher, Dan Evans visited Addis Ababa, Ethiopia from 1 through 8 July in support of two ongoing Network Science Center projects that are assisting in the analysis and understanding of economic development in frontier markets.



1) The Network Analysis “Tool Kit”

The Network Science Center has established a collaborative relationship with the State Department and during a visit to Ethiopia in May; Dan Evans demonstrated an initial version of the “Tool Kit” to Mr. Dan Rosenthal, the Commercial Officer at the US Embassy. This network analysis software package which will provide policy and decision makers with a “tool kit” that assists in the development of policy backed by a rigorous quantitative analysis package. Mr. Rosenthal indicated an interest in collaborating on the further development of this project.

Over the last month, 2 of our college apprentices, Marc Johnson and Lauren Kewley, and the two cadet researchers collected data on all key actors and organizations in the

Ethiopian “economic development network.” Based on this data, they developed an extensive network model and then built several visualization tools that quickly identified the most prominent nodes based on several different characteristics and developed a proposed node classification methodology.

2) Entrepreneur Network Model

The team also continued to develop an entrepreneur network model. Based on the visit in May, we developed a draft survey that captures data about the local environment in which entrepreneurs are operating. During this visit, the team met with local entrepreneurs and conducted a survey with each of them. The team has collaborated with CORE Lab at the Naval Postgraduate School and utilized an application they have developed called Lighthouse. This application allowed the team to conduct interviews with local entrepreneurs and collect the data on an Android-platform “smart phone.” This application uploads the data to the cloud, which then allows the team to quickly upload the data into network analysis software. This collaborative effort will be discussed in more depth in a future Network Science Center paper.

Ethiopia Background:

Ethiopia is unique among African countries in that the ancient Ethiopian monarchy maintained its freedom from colonial rule with the exception of a short-lived Italian occupation from 1936-41. In 1974, a military junta known as "the Derg," deposed Emperor Haile Selassie, who had ruled since 1930, and then established a socialist state. Torn by bloody coups, uprisings, wide-scale drought, and massive refugee problems, the regime was finally toppled in 1991 by the Ethiopian People's Revolutionary Democratic Front (EPRDF). A constitution was adopted in 1994, and Ethiopia's first multiparty elections were held in 1995.



The new African Union headquarters complex was inaugurated in Addis Ababa on 28 January 2012. The complex was built by China State Construction Engineering

Corporation as a gift from the Government of China, and consists of a 2,500-seat plenary hall and a 20-story office tower.

Ethiopia's economy is primarily focused on agriculture. According to the US State Department, agriculture accounts for 41% of GDP and 85% of total employment. Coffee was "discovered" here and is the major export crop. The agricultural sector has historically suffered from poor cultivation practices and frequent droughts.



The Government unveiled a five-year Growth and Transformation Plan in 2010. This plan is an ambitious government-led effort to achieve the country's development goals. According to the US State Department, Ethiopia has attracted significant foreign investment in commercial agriculture and manufacturing. However, the finance, insurance, and micro-credit industries are restricted to domestically-owned firms. Ethiopia's constitution mandates that the state owns all land and, subsequently, provides long-term leases to the tenants. The Government has started to issue land use "certificates" so that tenants have some type of recognizable rights to continued occupancy. While GDP growth has remained high, per capita income is among the lowest in the world.

Day 1 (July 2 2012)

The research team met with two important leaders of iceaddis, Ethiopia's first high tech innovation hub. iceaddis is located on the beautiful campus of the Ethiopian Institute of Architecture, Building Development, and City Development (EiABC). We were fortunate to be able to meet with the hub's managing director, Sarah Abdulhafiz and Markos Lemma, the Community Manager for iceaddis and Project Coordinator from Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (GIZ), a German federal

enterprise that supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.



Construction of Road Interchange in Addis Ababa

The hub is also supported by Center for Creative Leadership (CCL). CCL is a top-ranked, global provider of executive education headquartered in North Carolina and led by Admiral (Retired) John Ryan, a former Superintendent of the US Naval Academy. The Center has recently established an office in Addis Ababa and is heavily involved in a mentoring program with a group of 25 women college students who are associated with iceaddis.



The Ethiopian Institute of Architecture, Building Development, and City Development

Sarah further explained that iceaddis provides the following capabilities in order to accomplish its mission:

Provision of Open Space: iceaddis works closely with local entrepreneurs, students, and other local “communities” who share their innovative and entrepreneurial ideas and offers their “open space” for hosting meetings, conferences, and community summit events.

Prototyping Facilities: iceaddis has access to EiABC’s small-scale prototyping facilities. This gives the start-up companies to capability for customized fabrication.

Additionally, Sarah explained the iceaddis “Membership Model.” She told me that iceaddis currently has about 500 members. Basically, you can join the community at one of three membership levels:

White: White Membership is free of charge and is designed to open the innovative community to all interested individuals. White Members can access the online innovation forums and online resources. Generally, White Members can attend selected events.

Green: A 12-week Green Membership cost 850 Ethiopian Birr, or about \$48. This three month intense program takes talented, high-potential people, and turns them into elite, determined, and focused entrepreneurs. Green Members are required to give a presentation at the end of their program that is focused around their personal takeaways from the program, their ideas for the future, and possible business plans. Green Members have access to the lower floor of iceaddis which includes a general collaboration lounge, as well as computers that can be used for printing, and iceBookshelves.

Red: Red Membership cost 2,500 Ethiopian Birr a month, or about \$142. This membership level gives its participants a fully equipped workspace to work on a real start-up idea and gives the entrepreneurs all the facilities needed to successfully start their business. Red Members have access to the whole iceaddis building which includes a general collaboration lounge, as well as computers that can be used for printing, iceBookshelves, and most importantly a private desk, fully equipped with all necessary office equipment. iceaddis consultants provide professional support to network the technology and business facets of the start-up, as well as to enable them to create synergies, pool knowledge and source investment.

Sarah indicated that there are currently 7 active Red Members-none of these Members have “graduated,” or become independent of the hub yet. Of the 500 total members, there are approximately 35 Green Members.



Under the current business model, iceaddis supplies resources but no funding to the entrepreneurs. When the business signs on as a Red Member, it signs an agreement with iceaddis that grants iceaddis a percentage of the new business' equity. Sarah told me that each contract is customized based on the specific circumstance surrounding the business establishment. Although iceaddis supplies no funding, the hub does have an extensive network that facilitates introductions to potential funding sources such as local businessmen or NGOs.

The majority of the current iceaddis start-ups are “designed-based.” The hub encourages entrepreneurs to focus on ideas, services, or products that are “green, innovative, and meet the demands of the local market.” One example of an ongoing project is a new model of the bike trailer, an item that is ubiquitous in Ethiopia, which is to be constructed of more “green” components than the current models that are typically hand-made from scrap metal and old axles. The new model will primarily be constructed of bamboo which is abundant in Ethiopia and is a very durable material. Another example is a solar-powered lamp in which the battery charges during daylight hours and then the lamp supplies light during darkness and has an outlet that also allows the user to charge their mobile phone.

The purpose of the visit was to gather information in order to support the initiation of a project that will develop models of entrepreneur networks in frontier markets. The team has identified the network in Addis Ababa as one of great potential and at a state in its growth trajectory where we can capture vital data before the explosion. The staff at iceaddis has graciously agreed to collaborate on this project.



A Prototype of a “Green” Bicycle Trailer in the Lab

During the course of our meeting, we discussed basic small business issues in order to better understand the local business environment. From this conversation we received our first glimpse into what became a common thread throughout the trip: the presence of a gap between microfinance and large corporate investments in the business market. The creative environment in Ethiopia is energetic, with a large population of innovative Ethiopians both young and old wanting to enter into the market. However the common obstacle is acquiring initial funding to help build their ideas. Commercial loans are not accessible like they are in the developed world and many of the entrepreneurs we talked to discussed how their next step is to simply find some funding to kick start their projects.

Although there is a lot of current interest for investing in Ethiopia, it is mostly taking place on the grand scale. Large firms are not interested in looking at the small market of startups because of the lack of promise in profit turnaround. We were surprised by how far the definition of “small” stretches, with examples of some companies shunning million-dollar projects as too small. One interesting quote was how many Private Equity firms have the mindset that “it is better to manage 1 twenty million-dollar company than 10 two-million dollar companies.” So even though the need exists for investment funding, there are not many willing participators who want to play on the “smaller” level. It requires too much management and on-the-ground commitment, and is unattractive to foreign investors.



Meeting with an Entrepreneur at iceaddis

We also discussed the foreign presence in the Ethiopian market. The obvious first player mentioned was China, due to their ongoing extended investments in infrastructure across the country. After the Chinese, Turkey was mentioned as having the most influence. They are much more recent, described as just “popping up” in the markets. The United States was not mentioned so much in market influence, but instead in just on-the-ground presence. American citizens are prevalent in the country through many NGOs, but they are largely limited to this sector.

Another obstacle discussed was prejudice against domestic production due to stereotypes and old ideas of quality. One member mentioned how wine production is limited because citizens have the mindset that “Wine should be made in Italy or France.” Development is restricted because people are not willing to give domestic products a chance. Imported products are automatically believed to be of higher quality. Although this is usually true, it is restricting areas of the market where there is promise for comparable or even superior quality Ethiopian products.

Center for Creative Leadership (CCL)

The team also met with Mr. Tewodros Tadesse, the CCL’s Faculty Development Manager for the Africa Region. The CCL is “a top-ranked, global provider of executive education” headquartered in North Carolina and led by Admiral (Retired) John Ryan, a former Superintendent of the US Naval Academy. The Center has recently established an office in Addis Ababa and is heavily involved in a mentoring program with a group of 25 women college students who are associated with iceaddis.

Day 2 (July 3 2012)

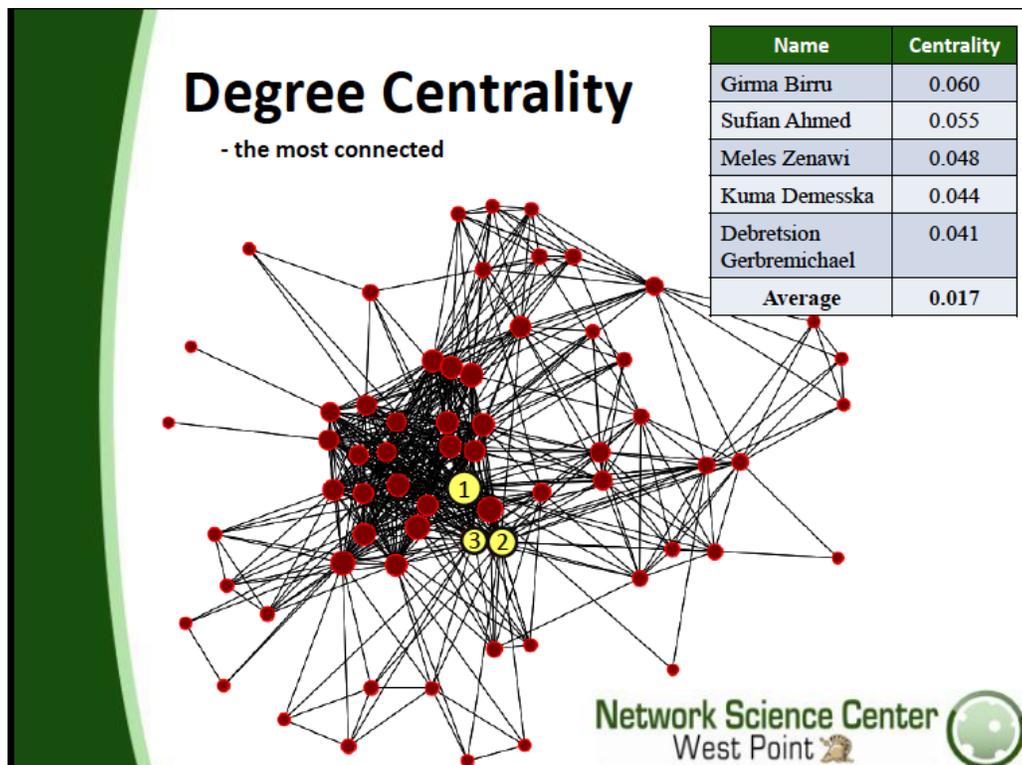
The Network Analysis "Tool Kit" Briefing and Demonstration:

The cadets presented their findings to members of the Political and Economic Sections at the US Embassy. Part of their presentation included several new visualization techniques that enable “everyday decision-makers and policy makers” with the capability to more effectively understand the analysis and recommendations. The presentation was well received and the discussion and feedback session after the presentation was particularly fruitful. Based on the recommendations, the Network Science Center will make adjustments to the current model and electronically submit to the Embassy staff in Ethiopia for an additional review.

Overall, the staff members were very intrigued by the network analysis methodology and are very interested in continuing to cooperate with the Network Science Center as the project progresses. The post-briefing discussion focused on the following ideas:

- Asymmetric relationships:
 - Considering the senior-subordinate relationship and its potential effects on a link (Influence possibly only travels in a single direction).
 - Consider weighting links. It was suggested that we explore splitting all symmetric links into directed links, and treat them separately depending on the relationship.
 - Consider establishing negative links. The staff members mentioned that animosity is often present in this “network”-they suggested that we consider some people as “enemies” (better term might be rivals?). These “negative” links could capture important aspects of the network that we currently don’t capture.
- Data considerations
 - Fighting factions-“Who fought with whom” during the revolutions against the Derg is the “most important” social connection in Ethiopia. “Nothing tops that.”
 - Ethnicity- It’s a “huge” consideration in Ethiopia. Ethiopian’s have a different image of nationality identification. An individual’s home province (kilil) is where their true loyalty and identity lies.
- Political Party subdivision
 - The Ethiopian People’s Revolutionary Democratic Front is the ruling coalition of four political groups: the Oromo Peoples’ Democratic Organization, the Amhara National Democratic Movement, the South Ethiopian Peoples’ Democratic Front, and the Tigrayan Peoples’ Liberation Front.
 - The “sub-parties matter-It doesn’t mean anything to consider them members of the EPRDF because *everyone* identifies with them politically.

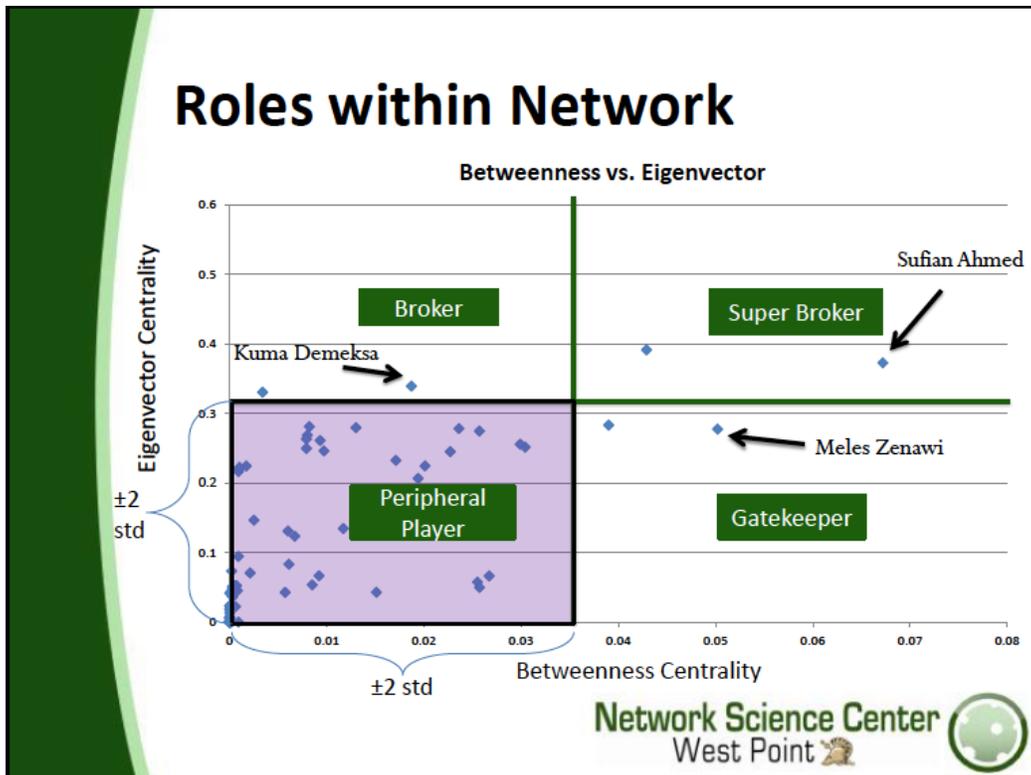
The sub-parties have an influence to themselves, and most relationships are connected through that level of the party



“Tool Kit Visualization” Example Developed for the Embassy Staff

- Foreign influence
 - Can we quantify China’s presence in our network – what type of influence does it exert?
- Educational weighing
 - The embassy staff downplayed educational connections-“Of course everyone went to Addis Ababa University.”
 - Secondary school is almost inconsequential
 - In many countries, these ties are amazing influential.
- Scope of the network – “How far to cast the net”
 - Sub-ministers play a huge role-Even mentioned an instance where it was clear that the government minister did not hold the power, but his subordinate was the decision maker
 - State level government important
 - More government organizations need to be included:
 - Local and national chamber of commerce
 - Parastatal Organizations

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- Suggestions for inclusion in the network
 - MIDROC (a conglomerate of 41 companies owned by Sheikh Mohammed Hussein Ali Al Amoudi an Saudi/Ethiopian businessman) of heavy influence, look at the sub-companies
 - Parastatal organizations
 - Deputy-state ministers
 - Directors General
 - Chamber of Commerce

TechnoServe

The team also had the opportunity to meet with Ms. Heather Oh, the Technoserve Country Director for Ethiopia. Technoserve is a 501(c)3 organization that works “with enterprising people in the developing world to build competitive farms, businesses, and industries.”

Ms. Oh told us that in Ethiopia TechnoServe is focusing on empowering local farmers in order to assist them in increasing their potential output and make production more efficient. In Ethiopia their regional office specializes in helping coffee production throughout the country. They equip the farmers to develop their coffee processing potential, allowing them to refine the coffee beans further before sending them to other production facilities. By increasing their control over this production process, they are cutting out other middlemen and increasing their own profits. Some even sell directly to major coffee names (such as Starbucks).

In our discussion it seemed that TechnoServe emphasized the business aspect of their organization model over any notions of charity work. Ms. Oh mentioned how it all comes back to the organizations ideas concerning the “Theory of Change.” They treat the projects with farmers as business interactions and not as aid work. Instead of handouts, they are giving loans with interest and expectations of repayment. She also mentioned how this makes farmers nervous because they are not accustomed to any accountability in funding.

Ms. Oh also mentioned that Technoserve invests “intensely” in their own staff members’ development. She mentioned that the lingering effects of history (the Derg regime and the experiment with Marxism) still hinder economic development. She also mentioned that the members of “the Diaspora” who have recently returned to Ethiopia and now lead many successful businesses.

Day 3 (July 4 2012)

The team met with the directors of several investment firms with a focus on emerging markets. These firms have asked us to not publicize then names of their firms or the

staff members. The team had a wide-ranging discussion with these investment professionals. The major points of discussion are summarized:

- Challenges in investing
 - Foreign money is typically associated with grants from NGOs. It was also stated that these small businesses are “not used to receiving foreign investment funds that come with the expectation of higher standards of accountability.”
 - Additionally, it was noted that “Private equity is a new concept” to the native business environment.
- Solutions
 - The firms described themselves as being “Hands on with their investments”-much more than typical private equity firms or other investors.
- Investment Vision in Ethiopia
 - The firms hope to be models of change and it was stated that they will “focus on financial return first,” but associated with positive environmental, social, and governance outcomes.
 - On mentioning of the statement we heard: “500 Thousand Dollars is too little for a single deal” the replies were “not for many businesses in Ethiopia.”
 - Consensus was that a domestic stock exchange is a “long way off” because the building blocks are not present for a stable market.
- Ethiopian Investing Idiosyncrasies: It was explained that foreign investing is not allowed in the following sectors:
 - Retail
 - Wholesale
 - Telecom
 - Banking
- Foreign Grants to Businesses: The investors were very negative about its impact on its own:
 - Does not force business to focus on the “bottom line.”
 - The investors were more concerned about the accountability investment brings to companies.
- Entrepreneurship: The investors were very interested in our Entrepreneurship Network Model- It was mentioned that “everything happens because of business networks” and “that’s how African countries work.”
- Final Thoughts: The investors emphasized the following facts:
 - “Americans aren’t taking advantage of this in Africa”

- China is doing a lot, but there are many challenges:
- Trust of American Products is high
- Government is so focused on exports:
 - Domestic market is growing though!
 - Ripe for foreign investment!

Day 3 & 4 (4-5 July)

The team met with local entrepreneurs. The notes from these meetings follow. The team is only using the “first names” of the entrepreneurs and has “anonymized” the business names in order to protect any intellectual property or capital.

Michael:

Michael started a business with his brother in the Information Technology sector. Michael specializes in software, while his brother focuses on hardware. Michael’s main objective is to “localize” business management software such as Enterprise Resource Planning (ERP) or E-Business applications by converting it to Amharic. This will allow businesses in Addis Ababa who operate primarily in Amharic to run their businesses more efficiently without the difficulties of using English based software. In order to start this business, he had to obtain 5 licenses all from different agencies. The complex bureaucratic system in place requires Michael to physically apply at the agencies and is a very expensive and time-consuming process. The government requires him to have financing in order to get his licenses, which can be gained through various sources, such as a commercial bank with an interest rate around 11%. His business currently has virtually no competition due to his innovative concept and his innovation. Even though the market is small, he is well known in this sector. He hires employees on a project-based or time-based contract and on average has 80 employees. One current challenge he faces is the ability to pay his employees on time because of late payments from some Chinese firms that have recently hired his company. Michael has worked as a sub-contractor for the Chinese firms several times and he made note that these firms were very difficult to work with. The Chinese firms were often very corrupt and would manipulate the tax system. Additionally, Michael has a second, smaller company that designed apps for mobile devices.



Interviewing a Local Entrepreneur

Michael is also involved with the One Laptop initiative based out of MIT. The idea is that children in remote communities with no prior access to schools or technology will have the ability to learn English through a tablet based interface. The program is still in its initial testing stages, but Michael is the man on the ground overseeing the program that includes approximately 20 kids ranging from age 4 to 12. We were able to visit the project site with him and this will be discussed later in this report. The children have made great progress over just a 3 month period and were already able to recite the ABCs and identify letters from verbal cues. Once they work out the systems kinks, they will be able to spread this program throughout Ethiopia in order to provide millions of children with this opportunity that they would otherwise not have.



Children working with Tablet Computers at One Laptop per Child Project Site

Berhane:

Berhane, an electrical engineer, is working with iceaddis while in the initial phases of initiating a manufacturing business. Berhane is addressing the prevalent issue of malaria. His idea is to create a small device that emits a frequency only audible to the mosquitoes that will irritate them in order to deter the mosquitoes from coming near the device. The concept is still in the design phase with a prototype already developed. He is still attempting to find the ideal frequency to deter the mosquitoes. Interestingly, during his research he found that mosquitoes have the ability to adapt to their environment and would be able to tune out a certain frequency if exposed to it for a long enough period of time. Therefore, Berhane's device would utilize a frequency hopping technique that would alternate through a series of 10 frequencies, incapacitating the mosquitoes' adaptation ability. His target market is the 85% of Ethiopians who live in rural areas that are highly susceptible to malaria. Even though Berhane has a innovative idea to address a real world issue plaguing Ethiopia, he is hindered by access to financing. Currently, he is unable to get the financing necessary to continue to make progress on his concept. This is also preventing him from renting his own workshop. Therefore, he joined iceaddis to help him develop his business model, use the incubator's workshop facilities, and continue his search for funding. iceaddis will allow him to continue to make progress on his concept and eventually become a licensed business.

Samson:

Samson is the owner of a film and production company. Samson is hired by other companies or people to create video and multimedia productions. During filming, Samson has a crew of seven employees. Samson took his firm to the next level by creating a innovative camera crane that allows his crew to film from higher angles. He has received a patent on this device which will allow him to protect his idea or sell camera cranes to other filming companies. This camera crane is just one example of Samson's ingenuity and mechanical knowledge. Interestingly, he is passionate about restoring cars. He has a collection of cars that he has personally restored ranging from a Chevy truck to a VW Bug. Ethiopia does not always have access to many of the parts and tools that are available in the developed world so Samson has become very adept in designing the items that he needs. Samson plans to apply his innovative drive to other projects in the future. One of his current projects includes designing a cheap tractor powered by old Volkswagen engines (these are plentiful in Ethiopia and easy to repair and maintain) that would allow farmers to plow their fields more efficiently. He is also exploring an idea that would design an ultra-light aircraft that would allow farmers to treat their crops from above.

Fitsum:

Fitsum, an electrical engineer and IT specialist, created a company that builds and operates large-scale networks. He gained some on the job experience by working for a local satellite campus of John Hopkins University and other IT corporations. Fitsum realized the void of skilled professionals in the IT field and decided to try to fill that gap. He told us that financing is the largest problem facing entrepreneurs trying to start a business. Therefore, Fitsum and his partners did various consulting projects in order to raise 1 Million Birr for startup capital. Then, he had to register the business in order to get licenses. He explained that this was a very difficult and long process because there are no clear procedures to how to apply for the different licenses at the various agencies. The majority of his time and effort spent obtaining licenses was just trying to navigate the confusing bureaucratic system. Eventually, he was able to get the company established and now they work as subcontractors for other companies who need IT work. This includes setting up and operating networks for large-scale events, like Google's recent convention in Addis Ababa.

There are still many issues facing Fitsum's company. The biggest challenge for Fitsum is retaining his staff of highly trained and experienced engineers. He has explored many methods in order to retain the quality employees such as attractive salary packages and other fringe benefits such as company cars. To Fitsum's surprise, administration work takes up about 60% of the time and he has had to hire more employees to meet his rising administration demand.

A major issue hindering the company is the fact that none of the materials are produced in Ethiopia and must be imported. The best approach to getting over this barrier is his professional network and building partnerships. Fitsum knows a supplier of IT equipment in the U.S. which allows him to get discounts and other deals that others would not normally have, which gives his company a distinct advantage against its competitors. Also, going through customs can be very time consuming and expensive, but contacts in the Customs Agency help. A challenge that he mentioned is that before you can even order the equipment, you must obtain a letter of credit from the bank which allows the Ethiopian Birr to change over to the U.S. Dollar. This process can take up to 6 months, severely impeding upon the company's ability to conduct business.

Unfortunately, Fitsum's company is still a small, like similar firms in Addis Ababa, and some larger projects are being outsourced to large Indian companies. Therefore, Fitsum and his company are making an effort to partner with the other small IT firms in Addis Ababa in order to keep contracts local, even if the job is too large for a single company.

Yonas:

Yonas is also an electrical engineer who previously worked at a Government Institute. 3 months ago he formed a company that develops Radio-Frequency Identification (RFID) inventory applications and is a member of iceaddis. Yonas believes that there is incredible potential for this technology in Ethiopia. He has one partner in the firm and a partner in the US who assist in procuring hardware. With the growth of the Ethiopian manufacturing and construction sectors, he believes that the RFID capabilities will be in great demand. To his knowledge, there are no other firms in this business. He is currently coordinating to test his system in several warehouses in the Addis Ababa area. He also emphasized that he believes by creating a successful business, he will be improving Ethiopian society and providing opportunities to its people. Yonas' firm currently has four main challenges:

1. Importing Hardware (RFID Chips and Scanners): The bureaucracy makes it difficult to import this equipment. It's more efficient to order "in bulk" but based on his firm's current size, a large inventory of hardware presents a challenge. It is also simply difficult to get items through customs in a timely manner and corruption is present.
2. Obtaining funding for near-term growth is a challenge as it is throughout Sub-Saharan Africa. Yonas is currently working on small jobs to fund growth and working with iceaddis as well.
3. Yonas' firm needs to improve their own infrastructure. They are currently utilizing space at iceaddis and another small space for an office. Eventually, they will need a professional space with access to reliable power and a reliable and fast internet connection.
4. The firm needs to be able to demonstrative the "value" of this technology to a potential customer base that may not have ever heard of it and are likely resistant to changing their operating procedures.

Day 5 & 6 (6 & 7 July)

The team spent these two days driving to, and visiting a "One Laptop per Child" study site located near Lake Wenchi. This visit is discussed in a blog post authored by Evan Szablowski: <http://blog.netsciwestpoint.org/2012/08/13/one-laptop-per-child/>. The team also took advantage of this visit and walked to the lake, which is actually a crater of a dormant volcano. At the lake shore, a local villager took us in a boat to an island in the lake that contained an old Ethiopian Orthodox Christian Church as well as a monastery. After a short tour, the group returned to the lake shore and rode horses back to the main ridgeline.



The Road to the Project Site



One Laptop per Child Project Site



Children at the Project Site

Conclusion

The briefing to the embassy staff yielded great insights and the team is currently adjusting our network model. We will share this modified network with them and published a paper that illustrates our methodology as well as the visualization tools that team has developed.



Local Villager transporting the Team to Island at Lake Wenchi



Ethiopian Orthodox Church on Island at Lake Wenchi

The entrepreneur interviews were also amazingly beneficial. The only “negative” was the limited time available to the team “on the ground” in Ethiopia. We could have used several more days meeting with additional entrepreneurs in order to expand our data set. Through coordination with iceaddis and several other organizations in Ethiopia, we have distributed a web-based survey in order to reach additional entrepreneurs in the local network.