

# Labor Hiring Practices and Produce Supply Chains in Rural Kenya: The Case for WishVast Networking

Steve Garguilo

BS, Information Sciences and Technology  
Penn State University  
University Park, PA 16802  
sdgarguilo@gmail.com

Matt Prindible

BS, Information Sciences and Technology  
Penn State University  
University Park, PA 16802  
mattprindible@gmail.com

Andrew Okello Syata

Entrepreneur, Small Business Owner  
Kobe Projects  
Nairobi, Kenya  
kobe.projects@gmail.com

Khanjan Mehta\*

Senior Research Associate, Electronic & Computer Services  
Affiliate Faculty, School of Engineering Design, Technology & Professional Programs  
College of Engineering, Penn State University  
University Park, PA 16802  
khanjan@enr.psu.edu

\*Corresponding Author

**Abstract – The ability for individuals in rural communities in Kenya to access resources needed to improve their economic and/or social situation is limited to the size of their social network. In this society, personal and business relationships are based very strongly on trust and respect. Social capital arises from the existence of trust in a society which, in turn, encourages cooperation in the generation of economic capital. Trust takes time to build. The importance of trust impedes the growth of an individual's network which could enable and facilitate more economic activity. This paper describes two applications of a working concept called WishVast that will help people expand their social networks, share more information, and access more opportunities. WishVast is a cellphone-based social networking system that attempts to harness the pervasiveness of cellphones in developing countries to build trust and optimize resource utilization and supply chains to facilitate people-to-people trade, with the ultimate goal of alleviating poverty. The paper explains the ethnographic research conducted by the team in Kenya to gain validation for the WishVast concept. The intricacies, social dynamics and inequalities of labor hiring practices and produce supply chains, two scenarios discussed in this paper, exemplify the need and business case for WishVast in developing communities in Kenya and around the world.**

*Index Terms* – market validation, social entrepreneurship, social networking, Kenya, cellphones

## INTRODUCTION AND CONTEXT

Social networks can be very powerful, and western nations have realized the potential of these networks over the past decade due to tools such as Facebook, Twitter, mySpace, and LinkedIn amongst others. Unfortunately, rural communities in developing countries do not have the same opportunities to expand and harness their social and economic networks given the absence of widespread prevalence of computers and internet access. Cellphone-based social networking applications are gradually making inroads into the American and European markets with over 30 startups competing in these markets.<sup>i</sup> According to the latest data from the United States Central Intelligence Agency, there are approximately 4.1 billion cellphone users worldwide.<sup>ii</sup> Many of these people do not have Internet access and can be reached only by phone. WishVast is a cellphone-based social networking system that attempts to harness the pervasiveness of cellphones in developing countries to build trust and optimize resource utilization and supply chains to facilitate people-to-people trade with the ultimate goal of alleviating poverty.<sup>iii</sup>

Social networks and cellphones play a pivotal role in creating sustainable cooperative business models, providing market information and identifying entrepreneurial champions in developing communities.<sup>iv v</sup> The social networks of people in developing communities are largely comprised of family and friends living in close geographical proximity. As the availability of mobile phones in these regions continues to rapidly increase, so does the ability to reach people in geographically-dispersed places. Connecting people in rural communities with each other and to people in urban areas is essential to achieving a fully-integrated and thriving society.

Facilitating the creation of trusting relationships is an essential step after connecting people. A study of the social networks of women agro-entrepreneurs in northern Tanzania revealed that the single most important component when conducting business is trust. Despite limited access to financial resources for individuals in developing regions, trust is more important than price, logistics and other factors when conducting business.<sup>vi</sup> Currently, business partners in these regions can trust each other with information over the phone because they already know each other. However, establishing trusting relationships with strangers is more difficult because while cellphones make long-distance communication easier, the screening of someone's trustworthiness is still based on the informal unwritten moral laws of families, clans, ethnic associations, marketplaces, churches, and the street.<sup>vii</sup> A reputation of having previous positive experiences is considered the strongest trust signal, and suggests higher certainty and less risk in conducting business.<sup>viii</sup>

The WishVast concept is based on the aforementioned power of social networks and importance of trust. WishVast allows users to form and join groups of local relevance to transmit information, meet new people, and build trusting relationships. WishVast users can send SMS text messages to the entire group to advertise themselves, their products or services, or get access to resources. WishVast users can realize the value of their current social networks, forge new relationships, and expand their social and business networks. Upon completion of a transaction over the WishVast network, users can exchange points to rate the quality of their interaction. This is similar to eBay's current model of providing buyer/seller feedback. Over time, these points add up, allowing trustworthy individuals to point to their ratings, and for a level of trust to already be understood when two people first meet. While digital trust can never be a full

substitute for the real thing, it is a building block that can allow more people to exchange reliable information and do better business by leveraging their digital reputation to foster a new means of accountability.

Anyone can be part of any group within the WishVast network, and anyone can create groups. There can be a number of different types of groups, and each creator would be the administrator in charge of the rules. Each group will have its own set of rules for the frequency of both parties rating each other. Depending on the interactions, ratings could be exchanged once per day, week, or month. The rating scale will also be determined uniquely for each group: it could be a +1 or +0 scenario where one can protect his or her points and just accumulate a total after successful interactions, or it could be a scale scenario so each side would rate a number  $n$  out of 10 after each interaction, and over time that total number will fluctuate to a representative number out of 10. It is essential that the rules be determined by a participatory process among the group members. These groups are similar to Facebook groups in that there can be a large number of groups and over time the group with the most realistic and practical rules will emerge as the most popular group, therefore attracting the largest amount of people. This will help build trust among group administrators as they will have to work together to agree upon the necessary set of rules so that the points have meaning and are reliable across multiple groups.

The WishVast concept was developed on the basis of a social networks study of women agro-entrepreneurs in northern Tanzania and observations and experiences working in East Africa over six years.<sup>ix</sup> During the Spring 2009 semester, a seven-member interdisciplinary team of undergraduate and graduate students from computer science, information sciences and technology, and instructional systems joined the WishVast dream through a three-credit course housed in the Humanitarian Engineering and Social Entrepreneurship initiative in the College of Engineering at the Pennsylvania State University.<sup>x</sup>

The original WishVast concept had strong theoretical underpinnings and a few scenarios for potential application. In order to then move the WishVast concept from theory to eventual commercialization, each potential scenario for implementation demanded sound validation. The team researched and articulated various scenarios where the WishVast networking system could be employed for building trust and social capital among users with the ultimate goal of poverty alleviation. Two members from the team and the faculty mentor traveled to Nyeri, Kenya (Figure 1) in Summer 2009 for a three-week period to validate the concept, business model and usability of the system.

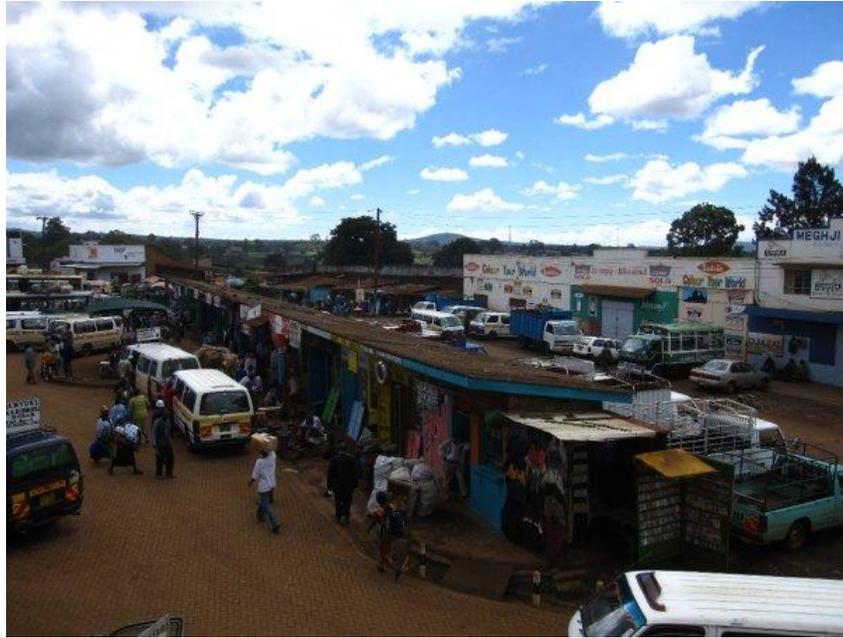


FIGURE 1  
A VIEW OF DOWNTOWN NYERI, KENYA, SUMMER 2009.

While in Kenya, the team worked closely with Andrew Okello Syata, a local entrepreneur, who helped the team quickly identify myriad potential uses for WishVast. Andrew works closely with the team's main partner on the ground, the Children and Youth Empowerment Center in Nyeri, Kenya, and he has a very good understanding of the local context and applicability of WishVast. During the three-week stint working in Nyeri, the team talked to nearly 100 individuals about their livelihoods, networks, how they do business, and how they use their cellphones. Based on these conversations, the team identified numerous compelling application scenarios, two of them being labor employment systems and produce supply chains.

The first section of this paper discusses the research conducted and technology developed by the team during the Spring 2009 semester, the proposed usability and business models, and the validation received in Kenya. The second section details the labor hiring practices scenario, while the third section delves into the processes and challenges of produce supply chains with a study of macadamia nut supply chains in central Kenya. The objective of this paper is to explain the ethnographic research conducted by the team in Kenya to gain validation for the WishVast concept. The intricacies, social dynamics and inequalities of labor hiring practices and produce supply chains, two scenarios illustrated in this paper, exemplify the need and business case for WishVast in communities in Kenya and around the world.

### TECHNOLOGY VALIDATION

The results of the study of women agro-entrepreneurs in northern Tanzania support the notion that there is an extremely high degree of overlap between an entrepreneur's social and business networks. The ability of an entrepreneur to develop and grow his or her business is directly related to the number of people he or she knows. The ability to connect entrepreneurs with

people of similar professions or interest who may be geographically-dispersed or even unknown in the same community can potentially be extremely valuable. The widespread availability and use of cellphones throughout Kenya provides a great opportunity to accomplish this goal.

It has been estimated that 97% of the people in Tanzania have access to a cellphone.<sup>xi</sup> The penetration rate for Kenya is very similar, which implies a large potential market for WishVast. There are four major cellphone service providers in Kenya with a total market of over 16 million users.<sup>xii</sup> Kenya's largest cellphone provider, Safaricom, started in 1997 as the first cellular provider. Through innovative business planning and product offerings, Safaricom now has well over 8 million subscribers. This success is attributed to making service plans affordable by offering prepaid plans that make sense for people who have a daily economy. Currently, it costs 50 Kenyan shillings (KES) (~\$0.63) for a SIM card and users can buy cellphone credits (1 credit = 1 KES) in amounts of 10 KES, 20 KES, 50 KES, 100 KES, and 500 KES. While incoming calls and SMS (Short Messaging Service) 160-character text messages are free, outgoing calls are 8 KES/min (~\$0.10) and outgoing SMS text messages are 3.5 KES (~\$0.04).

Peer-to-peer SMS messaging is popular in Kenya but broadcast systems are typically unidirectional, forcing users to request information from a centralized location and have it sent to their phone. A service built around social networking is a new, untested concept. Therefore, the success of WishVast will be proven through scenario development, ethnographic field research, and scenario validation to test the technology for reliability and scalability, the use cases for relevance, and the business case for economic sustainability.

Since the WishVast technology is a server-side system, users' cellphones do not require any additional hardware modifications or software installations to participate. In order to use WishVast, users' cellphones only require basic SMS text messaging capabilities. WishVast's administration system hardware (Figure 2) consists of a laptop computer tethered to a cellphone through a USB cable. Computers are widely available in Kenya, and the system will work with any computer that has a USB port. Cellphones are also widely available in Kenya, and the system requires a cellphone that has USB tethering and data transfer capabilities (the cellphone's hardware must be able to interpret AT-commands). For the prototype, the team purchased a Motorola V3i phone in Nyeri, Kenya for 2,998 KES (~\$40.00). While the administration system requires the advanced cellphone tethering and data capabilities, the users' cellphones do not.



FIGURE 2

THE WISHVAST HARDWARE: ONE LAPTOP, ONE CELLPHONE, ONE USB TETHER.

The “WishVast Network Management System” software was developed by the team as a cross-platform Java application. This application allows the cellphone to receive messages from WishVast’s users via SMS, then routes the messages appropriately by interfacing with a database on the computer. The system is designed for extreme affordability and flexibility. The estimated total cost of the administration system (laptop and cellphone with a USB tether) is less than \$300, and a simple netbook-based system will work for a network of approximately five hundred users. A more powerful computer will be required to handle larger networks.

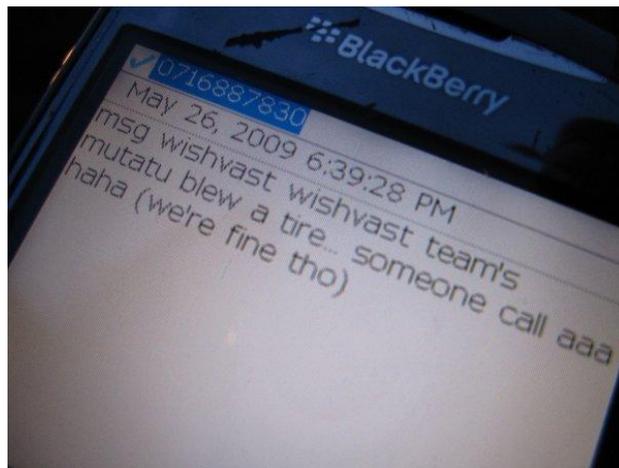


FIGURE 3

SAMPLE MESSAGE USED WHEN TESTING THE WISHVAST TECHNOLOGY IN KENYA.

Penn State students and local partners together formed a WishVast group in Kenya to test the WishVast technology. Twenty individuals from Penn State (out of the 37 member contingent) and six local partners exchanged messages using the WishVast system in various situations (as seen in Figure 3) and traded WishVast points throughout the three-week period. The system

consistently performed these tasks without major interruption. The problems encountered on the technology side included the computer shutting down or hibernating due to power failure or brownouts, or large queues of outgoing messages delaying the exchange of messages.

Through the five scenarios initially proposed during the Spring 2009 semester, our team investigated the nature of social networks and potential ways to facilitate their growth. In the Summer 2009 semester, our team further investigated these five scenarios, and discovered and articulated ten new scenarios while living and working in Kenya. Two of the scenarios that present the highest value proposition for users and the potential for large-scale social and economic impact are WishVast interventions in labor hiring practices and produce supply chains.

## LABOR HIRING PRACTICES

### *The Problem: Macro Perspective*

Kenya has a primarily agrarian economy with 80% of the population connected to agriculture. Although the employment rate in Kenya is estimated at 40%, it can be difficult and expensive to find and hire help in rural areas. This contradiction is due to a number of reasons - the vast physical distances people must travel looking for jobs, poor transportation system, urban migration of youth, the HIV/AIDS epidemic, and lack of trust between employers and employees, and astronomical fees charged by employment bureaus. A WishVast network has the potential to connect employers and employees without the added expense and hassle of third-party employment bureaus.



FIGURE 4  
SMALL SHAMBA IN NYERI, KENYA. SUMMER 2009.

Shamba (farm/garden) boys and house girls are employed by many people in Kenya to perform manual labor and any odd jobs that need to be done on a daily basis such as running errands and looking after the children. In Kenya, many people have shambas (shown in Figure

4), and they are closely related to social status in Kenyan culture, with more affluent individuals having larger shambas. Shamba boys and house girls are hired to maintain the garden and the household for the owner. They are typically paid about 3,000 KES (~\$40) per month for their services and sometimes payment may be in the form of a small meal or an offering of shelter. Shamba boys and house girls work for long hours performing physical work.

### *The Process and Economics of Finding a Job*

During a conversation about market pricing and access issues, a greenhouse owner in Nyeri, Kenya explained the process and costs associated with hiring individuals to work for her. The most common jobs in central Kenya are shamba boys and house girls. With a population of nearly one million people in the Nyeri area, it is estimated that there are nearly 300,000 shamba boy and house girl jobs.

These jobs are typically filled through a person's individual network, with friends and family helping each other find employees. However, these types of exchanges are not able to match all job-seekers and employers. Numerous job-seekers send and receive "flashes" to and from friends looking for jobs. The process of "flashing" involves calling someone and hanging up immediately so that the recipient sees a missed call and then calls back. It is free to "flash," so people looking for jobs who don't want to use credits (money) will do this to remind friends about themselves and get the other person to call back and thus pay for the call. Individuals reported getting as many as twenty such "flashes" per day! It is interesting to note that this practice led to so much network congestion for Safaricom (a major Kenyan cellphone network provider), that they now allow five free SMS "flashes" of "Please Call Me. Thank You." per day. Since calling back is expensive (8 KES/min rate), the fact that recipients of flashes have to decide who to call back implies that in some ways they are deciding who to remain friends with and which social ties to nurture.

Other forums such as newspapers, which cost 40 KES and are stapled shut so passersby cannot just pick them up to read, have very few classified sections advertising jobs. Radio advertisements for available jobs are sometimes made on select stations, but have their own limitations due to high cost for employers and lower penetration. The amount of traveling (walking) required and frustration involved with being turned down severely limit door-to-door searching for jobs. Job seekers also incur significant expenses traveling to other cities looking for work, oftentimes only to discover that none is available or none can be found. To increase their chances of finding a job, job-seekers work with employment bureaus.

### *Employment Bureaus and the Importance of Social Capital and Trust*

Employment bureaus are for-profit organizations that match employers with trustworthy job seekers. The size and power of an employment bureau's network is typically larger than an individual's and hence they are popular among both parties. The current process from the prospective employer's as well as employee's side involves the person going to a local employment bureau and paying between 700 KES - 1,000 KES (\$8.75 - \$12.50) to be paired with a potential employee/employer.

Table I shows salaries for house girls and shamba boys in different places throughout Kenya. This table hangs on the wall in the *Baraka Employment Services* office in Nyeri, Kenya. As shown in the table, the employees are paid an average of roughly 3,000 KES per month (and usually are provided with food and shelter) which implies that the bureau's fee is as much as one-third of their initial month's salary! For most unemployed people, it is extraordinarily difficult to come up with that amount of money. At some bureaus, the employer can pay this amount for the employee up front and it is then deducted from his or her first month's salary. This puts a larger burden on the employer as he has to pay double the money up front. Meanwhile, employment bureaus make 1,400 KES - 2,000 KES per match and typically place around 10 job-seekers a day. This is a very significant amount of revenue, although the employment bureaus do incur numerous expenses for advertising (200 KES for 2 days/week in the newspaper or 3,000 KES for a small magazine blurb) and following-up on references.

TABLE I

HOUSE GIRL AND SHAMBA BOY SALARIES IN KENYA	
House Girls & Shamba Boys	Payment/Month
Nairobi	3,500 KES
Nakuru	3,000 KES
Mombasa	3,500 KES
Kisumu	4,000 KES
Lodwar	4,000 KES
Lokichoggio	4,500 KES
Kitale	3,500 KES
Thika	3,000 KES
Nyeri	2,500 KES
Karatina	2,000 KES - 2,500 KES
Nyahururu	3,000 KES
Nanyuki	2,500 KES
Eldoret	3,500 KES
Kapenguria	4,500 KES
Kabaranet	4,500 KES
Narumoro	2,500 KES
Muranga	3,000 KES
Kiambu	3,500 KES
Meru	3,000 KES
Embu	3,000 KES
Kirinyaga	2,500 KES
Elementaita/Kiambogo	2,500 KES - 3,000 KES
Narok	2,500 KES - 3,000 KES
Kisiriri	3,000 KES
Naivasha	3,000 KES
Gilgil	2,500 KES - 3,000 KES
Kipipili-Mai Mahiu	2,500 KES - 3,000 KES

Upon going to the bureau, a prospective employee must submit a passport-sized photo and finger prints. This helps eliminate fraud and situations where an individual will go to an employer, steal from them and then disappear. At the bureaus we visited, there was a "Do Not Hire" list on the wall with names and pictures of people who had defrauded or robbed their employers. The prospective employee is also required to fill out a form which includes name, national ID card number, parents' names, location information, the area's chief (each area has a

different chief who will know all the people in his jurisdiction), church information, school information, marital status, phone number, experience, criminal record, and three references.

The bureau is responsible for vetting the three references specified by the applicant. However, since it's up to the applicant to select the references that he or she will list on the application, the references are not worth much because they will likely only be chosen by the applicant if they will give a favorable review. Any smart applicant would only include references with which he or she had a positive experience. If someone stole from his or her last employer, that name would obviously not make it on the reference sheet, and since it is so common to be out of work, the person could just say that he or she was unemployed during the time when he or she was actually stealing!

Employment bureaus survive and thrive on the basis of their trust and reputation. Hence, they spend a large amount of time and money carrying out due diligence on the references. Bureau employees will spend significant time on the phone with the references and sometimes will physically travel to see the references on the list so that they have a better picture of the prospective employee. If the bureaus start to do more business at a much larger scale, they might not know all the employees and employers very well, leading to improper matches that might harm their reputation.

The most intriguing and shocking piece of information was that according to the bureaus, shamba boys, and house girls we spoke with, these jobs last an average of only six months! At that point an employer and employee have to restart the job/employee search process and pay the necessary fees all over again. The reasons for this seem to be numerous and complex and we hope to get a better understanding of the dynamics in the future.

### *Applying WishVast to the Employment Scenario*

Employers and job-seekers could join a WishVast group of other people looking for work and looking to hire. This technology will allow someone to send out a mass SMS text message to the entire group stating that he or she is looking for work (or looking to hire), the location, and the expected/offered salary. Individuals interested in the proposition can respond to one of these messages and get connected in a matter of seconds from any location as opposed to the long distances traveled and time spent working through individual networks or employment bureaus.

Shamba boy and house girl jobs do not require very specific skills or certifications, so the amount of information that needs to be sent over an SMS text message is very limited. Even on the current job applications filed by the bureau, "skills" is not a category, and a CV or resume is not needed. The most critical piece of information in this system is the individual's rating, which can be based on several qualities such as: how hard does this person work, is this person reliable, and is this person trustworthy? Each group can uniquely define ratings. Each rating for this employment group is generated based on an accumulation of points given by previous employers (similar to the way an eBay user collects positive feedback). Our team has developed and is currently testing an algorithm that calculates the average of averages for the users that reduces the probability of users gaming/abusing the system.

WishVast's rating system can further assist the employer and job-seeker in making informed decisions. This includes the ability to view a prospective employee's ratings from various groups, and may include ratings and contact information of those who rated them. Based on this, a prospective employer could have a better assessment of whom to hire. The WishVast user can decide what information he or she wants to keep private or make public. By doing good work and getting good ratings, an employee is building up his or her digital reputation as a virtual CV which can be used to help in finding future employment and possibly even negotiations for a better salary. With the employment bureaus, salaries are largely fixed based on geography, but with the WishVast rating system in place, salaries could be based on past work history.

WishVast could also help the bureaus work together and share the profits when connecting people, while helping the job seekers and employers find a good match faster. This practice is currently done by the job bureaus making expensive phone calls. The bureaus we talked to reported that some days they make at least five or more calls to other bureaus asking about potential matches. If the first bureau they call does not have a match, they'll go down their list until they've talked to all ten bureaus in the Nyeri area. The goal of WishVast is to increase trust among its users and provide them means to harness their accumulated social capital to create financial returns. WishVast could supplement the bureaus or ultimately replace them (similar to the US context). WishVast can be used by the employers, employees or employment bureaus in different ways with different resulting dynamics that are hard to predict.

### *Secondary Outcomes*

Since the WishVast rating is a two-way process, not only will the employers be able to look up the employees, but it will also work the other way around. A woman looking for a house girl job can look up the ratings of a potential employer to check for a history of bad treatment or sexual abuse and make an informed decision based on past ratings.

There is also huge potential for short-term contract jobs to be more efficiently found. Many jobless people in Kenya (called "idlers") just walk around towns waiting to be approached about contract work. Contract work includes jobs such as working on a farm for a day, painting a room, house-sitting, translating, or other such simple ad-hoc jobs. These different types of jobs could also be further segmented out into their own specific groups, so that people with given skills could join just those groups. It will be up to the users of WishVast to dictate how this will evolve.

Another interesting aspect of these contract jobs is the inequality in pay for males and females. According to everyone we spoke to, males would usually be paid 200 KES per day for one of these day jobs, while a female would only be paid 150 KES for the same job. This is largely due to the fact that women are perceived to be less productive and most of the time the person is hired randomly as opposed to the employer knowing that person's past or reputation. With WishVast, individuals accumulate ratings over time so that performance and quality of service can become determining factors in employment and pay instead of gender.

Beyond these "idlers," house girls, shamba boys, and other people like single mothers who have a hard time holding down steady jobs, full-time employment is also extremely difficult to find for most people. Even after completing a college education, it can take people two years or

more to find a job. We met people who had been trying for three years or more to find full-time employment. WishVast can help people find short-term work and at the same time build up a good reputation which can ultimately help in finding full-time employment.

### *Business Case and Moving Forward*

There are a number of possible revenue streams for this scenario:

- The users could pay a small fee to enter the group (a one-time entry fee) as opposed to paying hundreds of KES each time users are looking for a job.
- The users who are looking to hire (or the users who are looking for work) could pay a fee to look at the user's WishVast ratings information before they are matched.
- The users who are looking to hire could also pay an additional fee to look at more detailed ratings information (e.g. how many ratings, when the person joined, how many groups, frequency of work). This adds an additional layer of trust in making the determination if this is a potentially desirable work relationship.

Even if the cost of this rating information was 300 KES for the employer, it would be a huge savings over the current 700 KES - 1,000 KES price, and would also allow the employer to reach more potential workers and see more information about their pasts. It's an even bigger savings for the potential employees who likely have very little to pay upfront costs.

Ideally, WishVast Inc. would start with one brick and mortar location in Nyeri that would be the hub to set up groups, determine rules, and get ratings printouts and advanced information. With a centralized WishVast system and WishVast network, there is great potential to reach the nearly one million people living in the Nyeri region.

## **MACADAMIA NUT SUPPLY CHAIN**

### *Macadamia Nut Supply Chain*

As discussed in the employment scenario, Kenya's economy is based largely on agriculture. Some of the major products exported from central Kenya include tea, coffee, and macadamia nuts. The journey of this small, delectable treat is much more complex and convoluted than most people would believe. The supply chain of the macadamia nut is inefficient and the farmers who grow the nuts receive a very small portion of the money ultimately paid by the final consumers.

Kenya is responsible for 10% of the world's total macadamia nut production, and their exporting of macadamia nuts has increased over the past few years. Kenya exported 6,030 tons of macadamia nuts in 2003, with exports rising to 11,100 tons in 2007.<sup>xiii</sup> <sup>xiv</sup> Macadamia nut season is from late February until early June. Each season, nuts are harvested by the estimated 100,000 macadamia nut farmers in Kenya, including 150 in the Nyeri area. Jane is one of those macadamia nut farmers who lives on her farm on the outskirts of Nyeri. She is 75 years old but picks, dries, shells, and cleans the nuts that grow on her farm (shown in Figure 5). Once this process is complete, Jane has few options for what to do with these nuts. She does not have the time or ability to take them into Nyeri town, where demand for them is limited, so the only option she has is selling the nuts to brokers.



FIGURE 5

MACADAMIA NUTS SHOWN IN VARIOUS STAGES OF THE DRYING AND SHELLING PROCESS.

Joseph and John are two of approximately ten macadamia nut brokers in Nyeri. During high season, they work from 6 a.m. to 6 p.m. visiting farms like Jane's to make deals and coordinate with all the parties involved. Most of their communication is over cellphones and they carry two cellphone batteries because one battery will not last the whole day. Brokers spend about 2,000 KES per week on cellphone credits for coordination!

The brokers compete with each other to buy from as many farmers as possible and maximize their profits. Due to the number of farms and large distances between farms, the brokers do not have the time to haul all the nuts, so they typically hire "bike boys" to pick up the nuts throughout the day and drop them off at a central location. The bike boys also use cellphones for communication and coordination. The brokers provide the bike boys with the necessary money to pay the farmers for the nuts upon pickup and a small share of the profits to remunerate them for their efforts. During peak season, individual brokers typically collect more than 1,000 kg of nuts on a daily basis.

Joseph and John are well-connected to a network of agents who will buy this daily supply of 1,000 kg of macadamia nuts and sell them in Nairobi. During the macadamia nut season, as many as 50 agents per day will come to Nyeri from Nairobi to buy nuts. These agents will talk to the brokers early each morning (typically on cellphones) and inform them of the price they are willing to pay for that particular day. The average price is around 35 KES/kg of nuts. Once the agents inform the brokers of their price, the brokers will sit down together and determine the price they will offer the farmers. The average price at which they buy from the farmers is around 20 KES/kg.

Once the nuts are dropped off at the central location, the brokers add some value by sorting the nuts into grades. While the brokers pay the farmers the same price for all the nuts, the agents will pay the brokers different amounts of money based on the grades of the nuts. Grade 1 nuts will get an average of 35 KES/kg, Grade 2 nuts fetch an average of 20 KES/kg, and the agents will not buy the Grade 3 nuts. The Grade 3 nuts are discarded or simply returned to the original farmers. Grade 1 nuts are the best quality nuts and will be packaged and exported for sale as

whole nuts. The Grade 2 nuts are slightly lower in quality and will be roasted, chopped, or used in some other type of product.

The agents will transport an average of one metric ton (1,400 kg) every evening to Nairobi, where they are sold for an average of 100 KES/kg. Given that we know there are around 50 agents who go to Nyeri each day, about 10 brokers that they talk to, and about 20 bike boys hired by each broker, there are more than 200 people (other than the farmers) making money off the nuts BEFORE they even arrive in Nairobi. While a farmer will only make a small amount by selling nuts, a broker can make as much money as 20,000 KES or more per week during macadamia nut season. Once the nuts reach Nairobi, they are then exported to the US, Europe, South Africa, India, or other places at rates ranging from 150 KES to 250 KES or they are sent to factories for processing. By the time the nuts are sold to the final customer, they are sold at a price of 20 KES or more for a package of just four nuts!

The idea of sustainable consumption is an important factor to many end consumers. If people in the west who are buying the finished product knew that the farmer was being taken advantage of so significantly, there could be more of a push on the consumer side to try to mitigate some of the problems with the current process.

#### *Role of Social Networks and Trust*

The existing social networks in this business are a serious barrier to entry. Close friends introduced Joseph and John to the business nine years ago. It is very difficult for new people to become brokers because the agents will always go to the people they already know and trust within their network. Generally, the brokers are part of informal RoSCA (Rotating Savings and Credit Association) “merry-go-round” lending schemes that allow them to share and save money and build trusting relationships at the same time. These relationships further facilitate collusion on prices and the farmers have no choice but to sell at the price dictated by the brokers. The farmers are not networked the way the brokers, bike boys and agents are.

In addition to the barriers of entry, there are also significant information asymmetries throughout the supply chain. For example, Jane, the farmer, doesn't know what the brokers do with the nuts, and beyond that the brokers don't know what the agents do with the nuts and so on down the supply chain. Each hop in the chain is powerless to negotiate with the next hop because there is no way to tap into the networks. Jane is not happy about this, nor are her fellow farmers with whom she regularly talks about this subject at church, but she doesn't know of any other options, and feels compelled to just sell to the brokers for whatever they are offering. There are no related cooperatives in the Nyeri area which can provide the farmers a common voice for collective bargaining. If the farmers can be connected with WishVast, they can have the chance to set their own prices and work together for the best deal.

Since the agents have the capital to own or rent vehicles, they can make up to five times the farmers' profit from the nuts without adding any material value beyond simple logistics coordination. Additionally, despite the fact the agents need the brokers to reach the farmers and the nuts (and the fact they speak the local language), the agents try as hard as possible to cut out the brokers. Sometimes if there are favorable weather and crop conditions, the agents can

actually go into town and hire “idlers” at a much lower rate to do the job of the brokers for the day in an effort to make more money.

This can only work to a certain extent, though, because trust is still an issue for farmers. It takes the brokers an average of three visits to build enough trust with the farmers for them to sell, even though they all offer the same price! Trust is an important issue throughout the entire supply chain: the brokers often have problems with the bike boys because there is no accountability. In order for the bike boys to pick up the nuts, the brokers need to trust them with the money advanced to pay the farmers. They have had instances in the past where the boys have run off with the money.

### *WishVast Intervention*

With WishVast, farmers can be connected directly to the agents or even directly to the exporters or to the end customers, with all those situations putting more money back in the farmer’s pocket. The reason this cannot happen now is because a farmer like Jane does not have access to the network of agents. She does, however, have a cellphone, and could send out an SMS text message each day informing the agents how many nuts she has, and could set her own price. Or, she could work with other farmers each day and they could all work together to set their price so that they get a fair share.

Given the struggles that farmers have in rural communities, being able to get full value for their crops would make serious strides in bringing these types of individuals out of poverty. Since they already have cellphones, WishVast could empower these people to join groups and take control of selling their product. They should be able to leverage demand to properly allocate their supply and sales. If participants could send out an SMS text message stating that a farmer or group of farmers has an amount of nuts, they could then further coordinate over SMS to get those nuts picked up, and could eliminate a lot of wasted money and inefficiency in the chain.

While one potential use of WishVast could be to eliminate the brokers, the brokers do face struggles that could be solved with WishVast. With WishVast ratings, the process of finding reliable bike boys could be made much easier. Another problem that brokers sometimes have is that they are sometimes ignored because they are smaller-scale than the agents. If the brokers wanted to go directly to a supermarket to sell the nuts they purchased, it is likely that they would be ignored because they don’t have big trucks and big names. By building a reputation themselves, it’s possible that they could have more opportunities than just selling the nuts to agents. Another interesting fact to consider in this scenario is that 80% of the macadamia nut farmers are women, but all of the brokers and all of the agents are men. WishVast ratings might foster more gender equity for prices and jobs (as brokers and agents).

### *Beyond Macadamia Nuts*

Many potential applications exist for WishVast to help improve supply chains in an agrarian economy. Entrepreneurial individuals in Kenya are especially interested in adding value along a supply chain, and WishVast can help people build that network to enable value-addition. For example, there is a lot of perishable produce (such as tomatoes) that ends up being wasted

because the supply chain is inefficient and ineffective. The amount of produce that is wasted could be reduced through value-added processing. In keeping with the tomato example, raw tomatoes have a very short shelf life that can be extended by processing the tomatoes into tomato paste or ketchup which has a much longer shelf life. The waste factor is made even more onerous by the fact there are so many hungry people in these regions.

WishVast can not only help connect farmers to potential buyers and consumers, but also to these entrepreneurs interested in adding value to make the ketchup or tomato sauce. This helps more people make more money and reduce waste at the same time. There are many examples that we discovered where this could be possible from connecting cow owners to people who could add value to milk, to connecting people who have trees/lumber to people who can make charcoal and furniture. When engaging in dialogue with entrepreneurial people in Kenya, the possibilities seem endless.

### CONCLUSIONS AND NEXT STEPS

With clear, detailed direction for at least two scenarios, and a wealth of new knowledge and experience to support ten other scenarios, the next steps for the WishVast venture are to prepare for a new semester of student work, further develop the business planning and future commercialization, further develop the technological components, and continue to develop scenarios to investigate during the Summer of 2010. Recruiting a larger student team with relevant expertise will help scale-up the effort and fill gaps remaining in the business planning and technology development.

For the Spring 2010 semester, the WishVast team will investigate the feasibility of developing atop an existing platform called FrontlineSMS. The platform currently enables organizations to run a variety of SMS services; however, the social networking concept has yet to be explored. By employing a proven system for delivering SMS services, the WishVast team can concentrate on developing the logic for handling the WishVast groups, messages, and points. Continuing to develop scenarios, and most importantly, developing a detailed business plan and value chain for each scenario, will help supporters of WishVast directly understand its potential social and economic impact. The next iteration of the “WishVast Network Management System” will be piloted in three different scenarios in Summer 2010 with the goal of establishing a self-sustaining commercial entity.

#### *Text. Trust. Transform.*

Effective utilization of the power of social networking can potentially unleash a new era of prosperity in developing regions. WishVast can bring this power to these regions on a platform that 97% of people already have access to: cellphones. The access to cellphones, capacity of SMS text messages, desire to do more business, and importance of trust all help to drive the WishVast dream of a trusting environment where information is shared and social capital is developed and harnessed for mutual benefit.

The value proposition of WishVast is clearly demonstrated in the labor hiring and produce supply chain scenarios. Our team will continue to further research these scenarios and further

develop the technology and business plans so that the launch of WishVast can be realized and the economy in these impoverished regions can flourish by being more open and inclusive.

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