

Understanding Social Capital, Networks & Institutions: A Guide to Support Compost Entrepreneurship for Rural Development

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Abstract

Compost micro-entrepreneurship has been used as strategy to increase the incomes of poor and rural farming communities. Nevertheless, several difficulties can arise to sustain these small businesses. The conversion of organic material into compost requires labor, tools and infrastructure. Many poor and rural microenterprises cannot afford all of these inputs to sustain operations. Literature suggests that social capital and collective action can address challenges related to limited resources for communities and small businesses. Little research, however, has explored how coworker characteristics and their cooperative efforts affect the financial sustainability of compost micro-enterprises. The objective of this study was to unveil whether rural compost microenterprises use social capital and/or collective action to address various challenges related to natural and financial capital, and if so, in what manner. A multisite case study framework was implemented using participant observation to identify common challenges faced by compost microenterprises in Chimaltenango, Guatemala. Focus groups and semi-structured interviews were conducted to determine if coworker characteristics (related to social capital) addressed these challenges, and if so, how. Four characteristics related to social capital emerged from a thematic analysis, including 1) raw material access based on coworker occupation, 2) overhead savings from human capital, 3) credit/market-entry granted from social networks, and 4) consumer trust gained from social capital/gender. It appears the investigation and development of compost microenterprises should be more cognizant of opportunities related to coworker characteristics, especially those related to social capital and collective action. As a result, management training can be integrated within entrepreneurship development to sustain urban and rural economies.

Keywords: collective action, compost, Guatemala, institutions, microenterprise, organic fertilizer, social capital

1. Introduction

Compost micro-entrepreneurship has been promoted as a strategy to assist financially vulnerable communities in developing countries (Vargas, 2000). A compost microenterprise is described as a small business that converts bioorganic waste into compost (also referred to organic fertilizer) for crop production. Natural inputs allocated for composting generally consist of agricultural residues and vegetation surrounding microenterprises (Morales, Perfecto, & Ferguson 2001). In most cases, these microenterprises are promoted in urban settings where compost is sold or exchanged for goods across informal markets (USAID, 2008). Compost, as a good, has shown to reduce poverty in a number of ways. For example, it can offer farmers an inexpensive soil fertility amendment, which can improve soil permeability, aeration, water-holding capacity and drainage (Qazi, Akram, Ahmad, Artiola, & Tuller, 2009; Williams, 2011). In turn, nitrogen response, crop yields, and overall food security can be increased (Baligar, Fageria, & He, 2001; Lal, 2006).

Several difficulties can arise to sustain these small businesses (Aremu & Adeyemi, 2011; Pittaway, Slizankiewicz, & Spence, 2001; Sembiring & Nitivattananon, 2010; Qazi et al., 2009). For instance, composing the proper ratio of carbon- and nitrogen-based materials (C:N) can be problematic, even for the well-versed agronomist (Singha,

Baruah, Bordoloi, Dutta, & Saikia, 2012). As such, many microenterprises face difficulties acquiring a sufficient amount of biomass that will decompose quickly and provide the productive benefits that synthetic fertilizer do (Miller & Jones, 1995). In addition, the conversion of organic material requires labor, tools and infrastructure (i.e., capital inputs) to expedite the decomposition process and limit losses from various climatic events (Silberg, Murphrey, Wingenbach, & Lombardini, 2013; Vukobratović, Lončarić, Vukobratović, Lončarić, & Čivić, 2008). Often impoverished households do not own or cannot afford the aforementioned capital. When trying to acquire these inputs, credit is limited (Karam, 2000). Even when financial, human and natural capital are available, microenterprises face hurdles in generating enough revenue to cover initial investment. For example, packaged fertilizer requires transport to markets, resulting in additional costs (Lutz, 1993). Once the organic fertilizer does reach the market, entrepreneurs still face challenges convincing consumers about the advantages of using compost over synthetic fertilizer (Seelos & Mair, 2007).

Much evidence suggests that social capital can strongly influence microenterprise development (Rakodi, 1999). Little research, however, has explored how social capital affects the financial sustainability of compost microenterprises (Richards & Haynes, 2014). In addition, minimal research has investigated these matters outside Africa and Southeast Asia. Studies in these continents have primarily focused on micro-entrepreneurship as a sanitary service in urban contexts (Elrayies, 2016). The objective of this research, therefore, was to fill a knowledge gap where enterprises have been explored little, specifically in Central America among rural communities (i.e., Chimaltenango, Guatemala). A multisite case study framework was implemented using focus groups, interviews and participant observations to assess the common challenges faced by compost microenterprises. The motivation of this study was to unveil if and how rural compost microenterprises used institutions, social capital and/or collective action to secure inputs, process raw material and vend organic fertilizer.

2. Compost Operations as They Relate to Social Capital, Human Capital and Collective Action

Microenterprises demand a dynamic list of tangible and intangible inputs to run operations. First, a sufficient amount of raw material (at affordable costs) must be available to convert into organic fertilizer (EPA, 1995). Microenterprises generally segregate raw material into three categories: green material (e.g., corn leaves), dry material (e.g., aged corn cane) and manure (e.g., horse droppings, cow droppings) (Vukobratović et al., 2008). Field tools, such as machetes and flat head shovels, are used to facilitate the necessary steps (**Figure 1**) of collecting, grinding, and converting raw material into organic fertilizer (Lapid, Ancheta, & Villareal, 1996).



Figure 1. Compost process: Collection of raw material, grinding, mixing and package

The decomposition process is typically completed on a concrete foundation under a roof. Roofing protects raw and processed material from climatic elements such as rain to prevent leaching of macronutrients (Koné et al., 2007). The operational grounds are also walled or gated for security purposes. The finished product is transported to the market or sold at the very depot where operations were conducted. Synthetic fertilizers are generally sold at agro-depots, large and small, dwarfing the informal market of organic fertilizer (Rios, Shively, & Masters, 2009). Organic fertilizer made from compost is typically vended by cooperatives formed by small-scale farmers (Rolz, Leon, Cifuentes, & Porres, 2010). Synthetic fertilizer is generally favored over compost because the benefits and formula are written on the package for the consumer to see (Carr, 2008). Price increases in Guatemala, however, have compelled farmers to search for cheaper alternatives such as compost (Oleas, Dooley, Shinn, & Giusti, 2010).

In Chimaltenango, men tend to dominate the mechanical and agricultural workforce (Rojas & Siga, 2009). Women assume positions such as textile producers, bakers, or domestic housewives (Piras, 2005). While occupations, such as farming, are not completely exclusive to one gender, participation in one that does not coincide with cultural norms occurs seldom (Rodgers & Boyer, 2006). The Guatemalan workforce provides a work force with a diverse skillsets to run compost microenterprises. Those organizing or establishing a

microenterprise (e.g., managers) tend to seek out coworkers familiar with carpentry, agronomy and agricultural business (Alam, Hossain, & Zaman, 2011). These occupations and their aggregated capital can streamline construction of composting structures, acquire loans, gather/deliver raw material, formulate compost-mixes, and finally, market and sell the product. Obtaining, processing and vending organic fertilizer can be mitigated with machinery, but limited finances constrain rural microenterprises to access such technologies. Thus, composting operations are highly dependent upon its workforce and its related capital.

Researchers argue that microenterprises that rely on the collective effort of multiple workers frequently outperform those individually managed (Al-hassan, Yussif, & Mohammed, 2013). For instance, as market prices for external inputs (e.g., fuel for processing equipment) fluctuate, individuals relying on such inputs to run operations can become financially vulnerable (Van der Ploeg et al., 2000). In contrast, microenterprises operated by communities with extensive social networks can absorb these shocks (Al-hassan et al., 2013). In this instance, social networks and cohesive societies provide multiple pipelines to access resources when they become expensive or scarce (Rakodi, 1999). Much of this greater access lies in self-organization. Greater self-organization expands social networks beyond the local level, creating more familiarity between coworkers and their access streams.

Awareness and access to community resources are facilitated by partnerships and collective action between local citizens and organizations. These partnerships often can decrease reliance on formal sector inputs to begin microenterprises (Baud, Grafakos, Hordijk, & Post, 2001). Researchers explain that collective action is achieved when a microenterprise “encompasses [a] homogenous group of people with common goals” (Barrett, Brandon, Gibson, & Gjertsen, 2001, p. 499). Homogeneity creates a high level of agreement among coworkers, reducing the incidence of conflict or mistrust that might truncate success. A high level of agreement is sometimes referred to as *social harmony*. Literature suggests that social harmony allows collective action to occur since coworkers are willing to cooperate among themselves (Curtis, 2003). Microenterprises can anticipate future challenges and address them accordingly with cooperation (VMSDFI, 1998). Aggregated social capital, therefore, should not be equated to collective action unless social harmony exists.

3. Addressing Challenges within Compost Microenterprises

According to the literature, compost microenterprises commonly face four challenges when acquiring, processing and vending material. These problems include 1) raw material availability, 2) labor/education related to processing, 3) financing, and 4) market-access (Hinrichs, Gulespie, & Feenstra, 2009; Somda, Nianogo, Nassa, & Sanou, 2002; Sseguya, Semana, & Bekunda, 1999).

3.1 Raw Material Availability

The acquisition and compositing of several raw materials can be difficult for a single entrepreneur. In microenterprises, different types of carbon (C)-based material can be sourced from coworkers' farms. Each coworker might cultivate different crops that provide raw material for composting at different times of the year. For example, when stover from annual crops (e.g., corn stalks) is unavailable before harvest season, coworkers can supplement C-based material with foliage from perennial crops (e.g., banana leaves) (Padam, Tin, Chye, & Abdullah, 2014). When coworkers do not own a farm, farms of friends and extended family or food processing factories can provide raw material from agro-waste. Ultimately, a microenterprise can gather different sources of raw material to aggregate and process into organic fertilizer. In turn, coworkers can supply larger markets and gain higher profits than they would otherwise individually. From this review, the collection of raw material may be a less constraining factor when compared to other succeeding challenges.

3.2 Labor/Education Related to Processing

Labor required to process raw material into compost is demanding. Compost production generally consists of several tasks following the collection of raw material. These include grinding raw material, mixing/aerating piles, sifting compost into finer particles, and packaging. Each task requires a specific combination of inputs. Sometimes these processes require fuel or electricity when machinery (e.g., conventional grinder) is used to expedite decomposition. Among all inputs, however, labor is the most critical. In this instance, female heads of household tend to have uninhibited access to free family labor (Kiser, Trevino, & McVicker, 2009). Access to labor ensures production is conducted in a timely and efficient manner.

Execution of the various steps requires skill and knowledge. The quality of organic fertilizer is likely to increase when information regarding decomposition rates for specific raw materials is available to entrepreneurs (Vukobratović et al., 2008). An employee who is knowledgeable about decomposition processes can communicate this information to fellow coworkers (Hinrichs et al., 2009). Singha et al. (2012) emphasizes that coworkers with experience in agriculture or its related industries tend to have more knowledge about biological

systems, offering a foundation for understanding decomposition processes. In addition, those outside the agricultural sector can stimulate conversation about new ideas and strategies to streamline operations (Oleas et al., 2009). Such social learning can advance processing techniques.

3.3 Credit: Quantity and Access

The agroecological location of a microenterprise and socioeconomic status of its coworkers can aid or hinder access to credit (Sseguya et al., 1999). Group-lending techniques have been shown to influence the amount and timeliness entrepreneurs access loans (Anderson, Locker, & Nugent, 2002). The financing needed for a microenterprise will depend on the structure, tools, and raw resources it intends to use. While investment in a structure to house composting operations may seem excessive, protection from rain and security from thieves ensures higher gross profits (Sharpley & Moyer, 2000). To finance such structures, a microenterprise has a better chance of acquiring a loan when its aggregates coworker capital, rather than trying to provide collateral on an individual basis (Anderson et al., 2002).

Community members are less resistant to microenterprises accessing rural commons (e.g., refuse from a farmers' market, public meeting houses) when multiple employees will benefit from their use rather than a single entrepreneur (Sembiring & Nitivattananon, 2010). Researchers explicate that partnerships within microenterprises "induce [growth of] both human and social capital" (p. 809). In turn, microenterprises may be permitted to utilize more forms of public goods as human and social capital grows. This might include infrastructure with a concrete platform (e.g., defunct basketball court) to house operations and decrease leaching of macronutrients (Pittaway, 2001). In using public infrastructure, operations can also expose operations to the community, reducing the "social stigma against...informal enterprises that produce new innovations" (Sembiring & Nitivattananon, 2010, p. 809).

3.4 Market Access

Shared values between consumers and entrepreneurs have shown to build a forum for producing and buying organic fertilizer (Porter & Kramer, 2011). For example, when products are produced and sold by commercial companies, consumers may be more inclined to purchase them from their local community members first. As some explain, the production and consumption of locally produced products creates a sense of camaraderie between producer and consumer, creating favorable markets for rural entrepreneurs (Seelos & Mair, 2007). Curtis (2003) adds from an ecological economics perspective that

...preservation of local natural capital relies upon the preservation of local social capital-the community-and vice versa. Nature cannot be preserved without the local community/economy that depends on its resources and services, laborers to use it well, who know it intimately and pass on the knowledge and values... Hence, social capital is central to a functioning, sustainable local economy (p. 87).

Fortunately for compost microenterprises, large businesses have taken notice of demand for local products. When the largest fertilizer company of Bangladesh (Map Agro) was approached by the urban poor to purchase and distribute locally-sourced compost, the company initially refused. After some persistence, the CEO offered a trial contract to entrepreneurs, guaranteeing the purchase of 200 tons per annum (Zurbrugg, Drescher, Rytz, Sinha, & Enayetullah, 2005). When consumers delivered positive feedback to Map Agro about the organic fertilizer, demand increased and the company invested in an all purpose enrichment factory. Eventually, the company sold pure-grounded and nutrient-enriched organic fertilizer, purchasing 50,000 tons/year from urban compost entrepreneurs. This success story was contingent upon many variables including resource availability, vending location, entrepreneurial population, and market demand (Onu, Surendran, & Price, 2014). Yet, the example should stand testament to how locally produced organic fertilizer can become a profitable venture for the poor through cooperative efforts and collective bargaining.

In an urban context, the close proximity of consumers allows compost microenterprises to engage directly with potential buyers. In addition, metropolitan areas give entrepreneurs free access to agro-waste that would otherwise be discarded by a paid sanitary service (Prain & De Zeeuw, 2007). One source of waste might include refuse discarded at farmers' markets. In Brazil, local governments were asked in the past by informal enterprises to assist with the collection of waste in their metropolitan areas. In turn, the government funded training modules for entrepreneurs to learn about waste conversion. By aligning production operations with municipal protocol, enterprises received a trademark seal indicating they conducted ecologically sound practices to produce organic fertilizer. Moreover, entrepreneurs were provided kiosks in supermarkets to vend organic fertilizer. Micro-entrepreneurs were fond of the kiosks given that they could communicate with food retailers more often. The communication increased opportunities to receive investment from local businesses for agro-industrial

technology and further processing facilities to expand production (Homen de Carvalho, 2001).

4. Methods

Methods of inquiry were informed by the manner in which microenterprises acquired, processed and marketed organic fertilizer. Based on the literature, the researchers determined which areas demanded further investigation. In considering these areas, the objective of the study was to determine how previously mentioned and newly identified coworker characteristics (related to social capital and/or collective action) addressed microenterprise challenges.

4.1 Site Description

The study was conducted in Chimaltenango, Guatemala (Figure 2). The region is classified as a subtropical highland (according to the Köppen–Geiger climate classification system) ranging 884-1,737 feet in altitude (Kohls & Dalmat, 1952). The three compost microenterprises observed were located in warm and temperate zones where summers receive ample rainfall (average 1183 mm/year) and the driest month is January (average 3 mm/year). The primary source of income was agriculture. At lower altitudes with higher temperatures, sugarcane, peanut and cassava were cultivated. At higher altitudes with cooler climates, coffee, barley, wheat, potatoes and maize were cultivated (IPGRI, 2002).



Figure 2. Map of Chimaltenango, Guatemala

4.2 Instrument Development

Data were gathered and examined from several cases with the intention to uncover phenomenon expressed by members of a group (Merriam, 2009). The study was defined as a multisite case study. Qualitative methods, including interviews, focus groups, and participant observation, were used to gather individuals' discernments about coworker traits that benefited their compost microenterprises. Qualitative research "places an emphasis on the dynamics between the researcher and the topic of study" allowing instrumentation to probe further in areas that quantitative instruments might overlook (Kiser et al., 2009, p. 121). These methods were used to further draw out discussions of how coworker traits were related (if at all) to social capital and how they may have impacted microenterprise operations. Then, social capital was assessed to determine to what extent, if any, affected sales.

4.3 Selection of Participants

Individuals and microenterprises included in the study were identified by The Norman E. Borlaug Institute from the "Agriculture in Guatemala: Technology, Education and Commercialization" (AGTEC) project. The AGTEC project delivered composting training modules to various microenterprises from 2010 to 2013. All three microenterprises selected for the study received training activities and were provided a gas-powered thresher (Honda 13HP 3600RPM Motor) to grind raw materials.

To enhance the range of information that could be gathered, managers from each microenterprise were contacted to request permission to collect data. As gatekeepers, managers could permit or prevent the accumulation of knowledge during the data collection phase (Erlandson, Harris, Skipper, & Allen, 1993). Data were collected during six focus group sessions across three microenterprises. Each focus group included five to eleven

participants. In addition, three individual interviews were conducted with two individuals from the first microenterprise and one individual from the second microenterprise. In total, 26 coworkers participated in either a focus group session or a semi-structured interview because of their continuous membership and participation with their microenterprise.

4.4 Data Collection Procedures

Field research was carried out over a one-month period in July 2011 to allow extended meetings to be conducted directly with microenterprises. Data were gathered in Spanish and translated into English by the lead author, who was an intermediate Spanish speaker. Native Spanish speakers accompanied him from The Norman E. Borlaug Institute and Texas A&M University. Staff ensured reliability of translation.

Individual interviews were guided by observations from focus groups and participants. Semi-structured interviews were conducted primarily with high position coworkers (e.g., president of a microenterprise) because of their knowledge regarding operational costs. Findings from private interviews did not supersede other data collected from focus groups. Finally, observation of processing and vending operations was used to reconfirm findings from individual interviews and focus groups. Observation served a critical role for follow-up questioning after preliminary interviews and focus group sessions. Visitation of all composting sites under investigation allowed the lead researcher to determine if coworker characteristics, social capital, and/or collective action were present in one or all microenterprises.

4.5 Data Reconfirmation Procedures

Reliability of findings was validated through several methods including member checking, triangulation, peer reviews, and prolonged engagement in data collection (Miles & Huberman, 1994). Data was triangulated by reconfirming findings with all respondents during focus group sessions and repeated visits. Triangulation, ensured claims made by the researcher were robust (Marshall & Rossman, 2011).

4.5.1 Coding

Participant responses were coded according to their microenterprise, using randomly assigned numbers. The numbers also signified the position a coworker held within their microenterprise: 1-President, 2-Vice-President, 3-Secretary, 4-Treasurer, =>5-Laborer. All other numbers were randomly assigned to coworkers not fulfilling administrative tasks. (Table 1).

Table 1. Respondent code according to microenterprise position and participation in study

Microenterprise	Participants of structured interviews	Participants of focus groups
A	President (A1), Laborer #2 (A6) SI,	President (A1), Secretary (A4), Laborer 1-8 (A5-A12)
B	President (B1)	President (B1), Vice President (B2), Treasurer (B3), Secretary (B4), Laborer 1-5 (B5-B9)
C	N/A	Vice President (C2), Treasurer (C3), Secretary (C4), Laborer 1-2 (C5-C6)

5. Results

Evidence from the study indicates that issues regarding the acquisition of raw material, infrastructure development, market penetration, and credit access were overcome by numerous types of capital and collective action that were neither derived from financial or physical assets. More specifically, coworkers' social networks afforded microenterprises the following benefits: trust from their consumers (about the product they were selling), infrastructure from their municipality to run operations, and information from occupations to better advertise compost. Each microenterprise differed in terms of their group identity, labor force, C/N-based material acquisition, coworker occupation, structure for composting, social networks, and market venues (Table 2).

Table 2. Microenterprise summary

	Microenterprise A	Microenterprise B	Microenterprise C
Group identity	Women's group	Women's group	Men's coffee cooperative
# of laborers	12	9	50
Primary source of C- & N-based raw material	Vegetation surrounding enterprise; cow manure	Dry maize stalks; strawberry foliage; donkey manure; cow manure	Coffee pulp from cooperative; vegetation surrounding cooperative; cow manure
Occupations of coworkers	Housewife; mechanic	Housewife; strawberry farmer	Coffee farmer; carpenter; mason; shop owner
Networks related to market entry and resource acquisition	Household gardeners; cabbage and maize farmers	Strawberry farmers; local government officials	Coffee farmers
Structure for composting operations	Cement walls with galvanize roof located in a hidden alleyway	Chain linked shed constructed around a defunct seed depot located in village epicenter	Cement walls with galvanize roof located in seed drying area of cooperative; ground modified to collect compost juice
Market for vending compost	At enterprise; local farmer's market	At enterprise	At cooperative to coffee farmers

Four characteristics emerged following thematic analysis that complemented the conceptual framework. These categories included 1) raw material access based on occupation, 2) overhead savings from human capital, 3) credit/market-entry based on social networks, and 4) consumer trust granted from social capital/gender. Representative quotes, accompanied by the use of audit trails to track participant identifiers, validated these findings.

5.1 Previous Occupations and Their Social Networks: Raw Material Acquisition

Each microenterprise had one, if not more, coworkers who practiced agriculture in some shape or form. Participants noted their connection agriculture most times granted them access to green material, but not manure. For example, a strawberry farmer from Microenterprise B had many relatives cultivating the same crop. Through this network, she could collect ample green material for her microenterprise. Although, "without the help of [her] friends" (B7) she would not have been able to harvest and carry enough material from her own field to sustain operations. In another instance, Microenterprise C was a coffee cooperative, granting free access to discarded pulp from coffee processing. Respondents believed access to this green material eliminated the cost of labor to collect the green material. One member mentioned, "We used to throw out this stuff, but now we use it. It makes our organic fertilizer look darker, so people know it's good" (C4). In focus group discussions, all coworkers mentioned they originally did not use the pulp on their farms out of fear of passing fungal diseases to their crops. Since learning about composting and its ability to reduce the transfer of disease, they were willing to use the pulp if it was composted.

Coworkers found they were able to identify common goals so collective action could be taken to address future challenges. For example, initially Microenterprise B was given free manure by a cattle owner the Vice-President knew, but after the owner became aware the microenterprise was profiting from the manure, he charged them. In turn, the Vice-President discovered a road where farmers frequently transported their crops to the city market via donkey. With this information, the coworkers collectively gathered manure weekly along the road instead of purchasing the manure from the cattle owner. The task took much longer when compared to collecting manure from the cattle owner. In addition, the manure "was not as rich" (B7). Still, Microenterprise B met its N-demands (for raw material) by collecting manure through the cooperative effort of many.

Human capital advantages: Overhead savings and composting skillset

Skills related to current and previous occupations were considered essential to reducing overhead costs. Microenterprise C stated two of their coworkers were carpenters/masons and that these coworkers constructed

their entire composting structure. It was emphasized later that saving on these construction costs significantly reduced initial investment. The two other microenterprises (A and B) outsourced their labor to build the structure and were still paying off loans to carpenters and masons during data collection. The impact coworker-skills had on input costs was more evident when the researcher inquired about the maintenance of threshers for grinding raw material. For instance, Microenterprise A mentioned that it was very beneficial to have a coworker who could maintain and repair their thresher. Other microenterprises stated they had fears of future mechanical problems and their associated costs. Unrelated to coworker skills, Microenterprise B saved on infrastructure costs by using a defunct maize storage depot for processing. When asked why they were not charged to use the depot, the President mentioned that a government official “felt that it would help many people” (B1), not just one person. Although, Microenterprise B still needed to purchase fencing to secure composting materials and machinery from thieves.

Several coworkers’ knowledge about the byproducts of composting increased profits for their microenterprise. For example, Microenterprise C had the only depot where flooring was specifically constructed to harvest liquid from decomposition (i.e., compost juice) (Figure 3). The liquid fertilizer was later sold to vegetable growers to apply to the foliage of their crops. In addition, Microenterprise C would reapply the liquid to their piles increase the presence of “beneficial organisms” (C6). When Microenterprise A and B were asked why their flooring had not been constructed in the same manner, they mentioned it was either too costly or they were unaware about the market for compost juice.



Figure 3. Structures housing compost operations

5.2 Understanding Institutions and Social Networks: Clever Advertising and Access to Credit/Markets

Understanding the path community members traveled to work and using that information to select a location for operations influenced how advertising. For example, coworkers from Microenterprise B chose an area where there was a high frequency of foot traffic to and from strawberry factories. In addition, they constructed their walls with chain-linked fences (as opposed to a concrete), allowing potential consumers to see operations and encourage inquiry about organic fertilizer.

The social networks coworkers had outside their microenterprises afforded them insights about consumer preferences. When coworkers from Microenterprise B were presented with compost samples from their competitors, one competitor mentioned that consumers would be more willing to purchase the organic fertilizer from Microenterprise C because the pulp made the compost “darker” and “heavier” (B4), implying better quality. The author could not confirm whether this material increased the productivity of various consumers’ soils relative to other compost; or, if the material was more preferable in markets compared to its counterparts.

Sales were increased by gendered networks. The President of Microenterprise A mentioned how, as a woman, she uncovered a niche market among her female counterparts in her community. When asked to elaborate, she explained that as a housewife and home gardener, she knew female consumers that wanted to practice small scale vegetable production, but could not afford the 100 lb. sack of synthetic fertilizer sold at farmer markets. The President of Microenterprise A shared this information with her coworkers and they decided to vend smaller amounts (10 lb.), enabling them to sell many small sacks rather than few 100 lb sacks.

The coffee cooperative also noted how their network of consumers secured profits. When asked if they were uncertain whether demand could keep up with their large supply, their secretary (C4) stated the production of 180 sacks was “marginal” compared to “the demand” of the 50 farmers’ consumer networks. Apart from securing markets, some microenterprises were able to secure loans to fund their operation. Microenterprise A and B obtained financing from local banking institutions by having a group of coworkers co-sign a loan. The treasurer (A3) of Microenterprise A elaborated that these loans could not have been secured individually, given

each member's limited capital.

5.3 Social Capital: Consumer Trust

To uncover any social capital that addressed microenterprise challenges, the researcher asked if coworker characteristics gave them preferential access to markets, and if so, how. Presidents from all microenterprises held separate businesses where they sold food and various goods to their local communities. Presidents from Microenterprise A and B stated they initially tried selling organic fertilizer to their long-term customers, given the trust they had built with them. "I have been selling soap and other things to these families for years, so I knew which ones were having babies, which ones had farms and which ones had more money" (A1).

At the closing of each focus group, coworkers were asked to "Describe their relationship and/or communication with consumers." Several female coworkers employed by Microenterprise A and B responded that it was difficult to gain trust from male consumers. The coworkers elaborated that the majority of their consumers were male farmers. One coworker from Microenterprise A indicated the advantage of having a male coworker was that many of their on-site purchases were conducted on his behalf. "I think the [male] farmers trust him because he is a man. Men are farmers here, not women" (A7). In contrast, the President of Microenterprise B capitalized on sales to female consumers, mentioning that organic fertilizer produced "safe food to feed to [their] children" (B1) as opposed to food grown from synthetic chemicals.

6. Discussion and Conclusions

Research investigating enterprise-development has particularly focused on the limiting factors associated with gender, socioeconomic status, and agroecological endowment (Rakodie, 1999). It appears that investigation of compost microenterprises should be more cognizant of *opportunities* related to these characteristics, especially those related to social capital and collective action. Researchers add that a quintessential factor to sustaining urban and rural economies lies in community members (Hancock, 2001). "For if as a society...we are not in the business of improving ...human development and human capital, what business are we in?" (p. 277).

The study revealed that agronomic skills and social networks granted access to free raw material. Access to several types of C-based materials, as opposed to one, made microenterprises less vulnerable to biomass shortages at various times of the year (Padam et al., 2014). In regards to N-based material, findings agree with arguments that groups with high levels of social cohesion are more resilient and can absorb unexpected shocks (Rakodi, 1999). For example, when Microenterprise B was faced with being charged for manure they previously had free access to, coworkers collectively harvested donkey droppings from the roadside. In addition to resilience, microenterprises increased output at a quicker rate when they had individuals with agronomic experience. This finding complimented Singha et al. (2012) claims that entrepreneurs versed in biological systems had better long-term success with their organic fertilizer ventures.

Non-agricultural backgrounds reduced input costs and added profit for microenterprises. Masonry and mechanical skills were particularly beneficial given that they mitigated costs to construct processing units and repair/service machinery. In addition, access to defunct infrastructure reduced the largest costs for microenterprises. Female-dominated occupations were beneficial as well. In accordance with Hancock's (2001) findings, microenterprises perceived as businesses that are concerned about the well being of their communities and coworkers tend to receive preferential access to public commons. Businesses indifferent about their coworkers or communities may otherwise not have such access. Housewives capitalized on this 'well being' component, reaching consumers outside the agricultural sector. By understanding consumer needs for safe food and household nutrition, Microenterprise A created niche markets for organic fertilizer. As stated by Porter and Kramer (2011), "Societal needs, not just conventional economic needs, define markets..." (p. 5). In this respect, Microenterprise A utilized institutions of trust to sell their product, confirming Seelos and Mair's (2007) argument that entrepreneurs profit from vending materials that embody *care*.

The Presidents of some microenterprises used the social accord they had within their communities to sell organic fertilizer. Some argue that when entrepreneurs already have businesses in communities where they will begin a composting venture, their established trust makes consumers more receptive to buying new products (Narayan, 1997). Still, trust appeared most evident among men with agriculture backgrounds (e.g., Microenterprise A had a male coworker sell compost to male farmers). Farming skills may also offer a more credible perception of the entrepreneur to the agricultural consumer, explaining the difference or benefits of compost relative to synthetic fertilizer (Hinrichs et al., 2009). Before gaining trust, however, communities need to be aware of the value of organic fertilizer. In this respect, Microenterprise B purposefully processed their compost in a central location for their entire community to see. These findings concur with Prain and De Zeeuw's (2007) study, whereby microenterprises profited more when they were located in close proximity to their consumers. Furthermore, these

findings are consistent with the argument that open operations catalyze more discussion and diffuse innovations quicker through social networks rather than vendors advertising their own fertilizer via word-of-mouth (Baud et al., 2001).

6.1 Recommendations for Future Research

In order to further compost microenterprise development, more studies must investigate the inputs required to run such microenterprises, as well as, their performance under similar and different conditions (e.g., access to material, assistance). These investigations would validate, refute, or elaborate the current study's findings. This case study was limited, due to the number of microenterprises (i.e., 3) and time (i.e., 6 weeks) available to conduct observation. An evaluation of additional six-week cycles may validate the output from given inputs. For example, the inputs and outputs of eleven six-week cycles collected from each of the three microenterprises would offer a more substantial sample for quantitative analysis. On the other hand, one six-week cycle observed across +31 separate compost microenterprises would increase validity of the study as well. Microenterprise studies must evaluate a sufficient number of cases (i.e., compost microenterprises or employees of compost microenterprises) to determine if the advantages associated with each trait identified are consistent across different contexts. Additional advantages (if any) associated with the identified social capital should be observed over a longer period as well. Moreover, other challenges and social capital impacting microenterprises must be explored.

6.2 Policy, Development and Extension Implications

Individuals striving to develop compost microenterprises in poor and rural settings must be mindful of employee characteristics. Capital embedded within coworkers and their social networks should be used as a starting point to assess the readily-available benefits for a microenterprise to enter local markets. An understanding about how each characteristic and/or capital affects microenterprises provides educators, program leaders and extension agents insights how to utilize or align these characteristics with local institutions. For example, social capital related to non-agricultural skills and consumer identification (e.g., coffee farmers vs housewives) should be identified prior to the establishing operations and marketing organic fertilizer. Recognition and awareness of the benefits offered by collective action can serve as a better framework to develop a cohesive all-encompassing workforce for operating a sustainable microenterprise.

Microenterprise development can serve as an important tool for addressing poverty. The development of these small businesses, however, depends on those who utilize coworker capital to harness collective action. The importance of this study lies in its identification of the interlinked coworker-characteristics and microenterprise-challenges. Educators, program leaders and extension agents must be cognizant of these relationships to forge success, especially in terms of coworker-recruitment (Ndlela & Toit, 2001). Failure to recognize the input costs (e.g., masonry for construction and manure access) and market entry related to social capital will ultimately inhibit plans for microenterprises reach financial sustainability.

Each coworker trait affects a microenterprise differently; however, it depends upon management "...to examine how to develop and exploit these ...characteristics...to gain a competitive advantage" (Ndlela & Toit, 2001, p. 1). While a variable such as social capital may not be quantified exactly, "...it should be argued as a variable that can...have a structural impact on productivity" (Zwick, 2004, p. 729). Financial capital, natural endowment, and specific modifications to infrastructure are necessary for compost microenterprises to function. Yet, to raise prosperity, substantial evidence from this study posits that these types of tangible capital cannot exist without cooperative coworkers and supportive institutions (Sembiring & Nitivattananon, 2010).

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